Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

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Commercial Fisheries Abstracts

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The abstracts in this leaflet may be left in their present form; but it is suggested that to make the most efficient use of them, they be cut out on the lines designated and filed by the number in the upper left-hand corner of each. For a full description of this filing system see "Fishery Technological Abstract Card System" by Maurice E. Stansby and K. L. Osterhaug, Fishery Leaflet No. 232, obtainable free by request from Fish and Wildlife Service, Washington 25, D. C.

In addition to the regular abstracts, there is included a bibliography of references of secondary importance (without abstracts). These may be cut off on the lines designated and pasted on standard 3 x 5-inch cards for filing.

Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0	General and theoretical	5	Vitamins
1	Fish by species	6	Fishery byproducts
2	Fresh fish	7	Analytical Methods
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4	Oils	9	Miscellaneous

Issued with the approval of the Bureau of the Budget, December 29, 1953

7.641 ASSAY OF FEEDSTUFFS AND CONCENTRATES FOR VITAMIN B_{12} POTENCY

Lillie, Robert J.; Bird, H. R.; Sizemore, J. R.; Kellogg, W. L.; and Denton, C. A.
Poultry Science 33, No. 4, 686-691 (July 1954)

Day-old chicks obtained from Rhode Island hens fed a diet deficient in vitamin B_{12} were kept in a multiple unit brooder house on shavings litter and fed a vitamin B_{12}-deficient diet containing 70% soybean meal. The chick and maternal diets are shown in table 1 (this card, over).

The chicks were weighed individually when 14 days old and only those in the intermediate weight group were selected for use in assay groups of 12 chicks each. Chick assays of 14 days duration were carried out in metal batteries with raised screen floors. These batteries were located in a room air-conditioned to 80° F. The diets and water were supplied ad libitum. In each assay, one or two groups received the basal diet, other groups received the basal diet supplemented with graded levels of crystalline vitamin B_{12}, and still other groups received the test materials, each material being fed at one or two levels. On termination of the assays at the end of 14 days, a vitamin B_{12} dose-response curve was constructed by plotting weight gains against the dietary levels of crystalline vitamin B_{12}. The vitamin B_{12} potency of each material assayed was estimated by applying the gain obtained with it to the dose-response curve.

Samples of all of the feedstuffs and concentrates were extracted in the presence of sodium bisulfite or sodium cyanide (Denton and Kellogg, 1953), and assayed microbiologically by the U. S. Pharmacopoeia method (1950) to estimate the vitamin B_{12} potency. The vitamin B_{12} potencies of all of the materials are summarized in tables 2, 3, and 4 (this card, over). According to tables 3 and 4, seven out of eight samples of fish meal contained similar quantities of vitamin B_{12} irrespective of the method of assay used, whereas 5 out of 6 samples of fish solubles contained dissimilar quantities of vitamin B_{12}.

(over)

 ABSTRACTER: Martin Heerdt

8.42 CADMIUM IN SEA-WATER

Mullin, J. B. and Riley, J. P.
Nature 174, No. 4418, 42 (July 3, 1954)

Although cadmium has been detected in a number of marine animals in amounts ranging from 0.03 to 11 mgm. per kgm. of the dried organism, its presence in the sea has not so far been established except by inference. Thus Baidet et al., who were able to identify spectrographically fourteen trace metals in a concentrate from 60 l. of sea-water from Roscoff (Brittany), were not able to detect cadmium. Noddack and Noddack consider that the concentration of cadmium in the sea is less than 0.5 μgm./l.

In the present investigation, cadmium was extracted from 1-litre samples of sea-water from the Irish Sea by means of a chloroform solution of dithizone in the presence of cyanide at pH 8.8 The cadmium in the extracts was determined spectrophotometrically by a modification of Saltzman's dithizone method (detection limit 0.006 μgm. cadmium).

The unequivocal detection of cadmium was carried out by evaporation of the dithizone extracts on spectrographically pure calcium carbonate. The products were examined spectrographically by means of a d.c. arc taking 5.5 amp., between pure graphite electrodes. Blank determinations revealed the absence of cadmium in the reagents. In all the spectrograms of sea-water samples the raies ultimes of cadmium at 2288.018 A. and 2265.017 A. were strong, and in some a further line at 3261.057 A. was visible. No other elements could be detected in the dithizone extracts. Tests on known amounts of cadmium showed that the 2288.018 A. line was just visible when 5 mμg. of cadmium was present. This is a considerably greater sensitivity than can be attained by means of the copper spark method, or using sodium fluoride as a carrier. Five samples of surface water

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7.6132 SIMPLIFIED PROCEDURE FOR EXTRACTION AND DETERMINATION OF VITAMIN A IN LIVER

Ames, Stanley R.; Risley, Hugh A.; and Harris, Philip L. (Distillation Products Industries, Rochester, New York)
Analytical Chemistry 26, No. 8, 1378-81 (August 1954)

During the course of developing a modified vitamin A bioassay of the liver-storage type, the authors critically evaluated the currently used methods for determining vitamin A in liver tissue. They found that none of the published methods combined the accuracy and precision desired with the speed and ease of performance needed for routine analyses. To eliminate these shortcomings, they developed a simplified procedure that involved drying the liver by grinding it with anhydrous sodium sulfate, adding ethyl ether to extract the vitamin A, evaporating the ether from an aliquot, dissolving the residue in chloroform, and determining vitamin A by means of the Carr-Price (antimony trichloride) reaction.

As a check on losses during analysis, the authors determined the recovery of vitamin A from vitamin A-depleted rats. Their recovery of 98.6 ± 0.56% of added vitamin A showed that no significant amount was lost during analysis and indicated that no interfering substances were extracted.

In other work, the authors gave consideration to the possibility that nonvitamin A substances yielding a blue color with antimony trichloride might be present. The approximate agreement of the various methods they used for estimating vitamin A showed that the antimony trichloride method is satisfactory for the determination of vitamin A in rat livers under the conditions of their tests.

(over)

 ABSTRACTER: F. Bruce Sanford

8.50 STUDIES ON THE GREEN DISCOLORATION OF FROZEN SWORDFISH. II. SOME EXPERIMENTS ON THE CAUSE OF THE DISCOLORATION

Amano, Keishi and Tomiya, Fumica (Tokai Regional Fisheries Research Laboratory, Tokyo)
Bulletin of the Japanese Society of Scientific Fisheries 19, No. 5, 671-687 (1953)

The discoloration occurs just beneath the skin on the ventral and lateral sides and often also in the abdominal cavity. It occurs more often in the presence of blood or dark flesh. When swordfish containing such green discoloration is stored below -15° C. there is a tendency for the discoloration to spread during the first 2 weeks; thereafter no change takes place The flesh containing the green discoloration is always at an early stage of decomposition, whereas the bulk of the flesh is not.

The green pigment is soluble in water but is insoluble in ethanol, methanol, butanol, benzol, and ether. The adsorption spectrum differs markedly from that of Pseudomonas fluorescens having a maximum at 418 mμ. Other chemical tests indicate that the pigment can not be Pseudomonas fluorescens.

The green flesh contains 1 to 2 mg. hydrogen sulfide per 100 grams. Injection of a dilute hydrogen sulfide solution into normal swordfish flesh resulted, after elapse of a day or so, in development of green discoloration at the site of the injection. Storage of this sample at -15° C. resulted in spreading of the discolored area during the first 2 weeks of the storage. A minimum of 1.25 mg. hydrogen sulfide per 100 grams flesh is required to produce the discoloration. Similar artificial discoloration was carried out with both flatfishes and dogfish.

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 ABSTRACTER: M. E. Stansby

VITAMIN B_{12} ASSAY

SIMPLIFIED VITAMIN A ANALYSIS

CADMIUM IN SEA WATER

GREEN DISCOLORED SWORDFISH

7.6132

In summary, the new simplified procedure gives significantly higher recovery of vitamin A from liver, compared with currently used procedures. This high recovery results from an improved extraction technique with fewer manipulations and involving less destruction by avoiding both heat and prolonged manipulation of the extract. It combines both speed and precision (standard deviation, 2.4 percent; standard error, 0.56 percent), which fact recommends it for use in routine analyses. It also serves as an essential part of a liver-storage type bioassay developed by Ames and Harris for the accurate and economical determination of vitamin A in oils and pharmaceuticals. (The Ames-Harris method is to be published later).

8.50 (Cross References: 1.1, 2.01)

Production of hydrogen sulfide by putrefactive bacteria in the swordfish flesh is believed to be the cause of the discoloration. Some reaction between the hydrogen sulfide and certain pigments such as haemoglobin or myoglobin is believed to result in formation of the green pigment.

For reducing the formation of green discoloration in swordfish, use of only prime quality, fresh raw material is suggested. It is recommended that the fish be bled and eviscerated immediately after catching.

Following is an analysis of green and normal swordfish flesh:

Sample	Bacterial count per gram	Volatile basic nitrogen mg. %	pH	Iron mg. %	Copper mg. %
Green meat	300 - 620	22.9	6.2	5.7	0.25
Normal meat	370 - 1,200	16.3	5.6	2.5	0.25

7.641

The vitamin B_{12} values for fish solubles and liver preparations were much greater by chick assay than by microbiological assay presumably because these materials are potential sources of unidentified growth factors.

TABLE 2.—*Vitamin B_{12} potency of some feedstuffs and concentrates obtained by chick assay*

Material assayed	No. tests (12 chicks per test)	Vitamin B_{12} potency
		Micrograms per gram
Commercial B_{12} concentrate A	8	1.51
Commercial B_{12} concentrate D	2	1.26
Liver meal	6	0.55
Meat and bone scrap No. 1	2	0.10
Norway fish meal	4	0.25
Herring fish meal No. 7	5	0.30
Whale solubles No. 1	4	0.28
Poultry viscera meal A	4	0.31
Poultry viscera meal B	3	0.25
Sponge meal	4	0.16
Buttermilk, dried	1	0.02
Whey, dried, No. 1	4	0.03
Fungal amylase distillers' solubles	5	0.03
Malt amylase distillers' solubles	5	0.03

TABLE 1.—*Composition of diets*

Ingredient	Maternal diet 311 (percent)	Chick basal diet (percent)
Ground corn	57.0	23.0
Alfalfa meal	5.0	3.0
Soybean meal	30.0	70.0
Butyl fermentation solubles (300 mcg. riboflavin/lb.)	0.5	0.6
Steamed bonemeal	4.2	1.5
Limestone flour	2.3	1.0
Iodized salt	0.2	—
Manganized salt (4% $MnSO_4$)	—	0.7
Manganized salt (6% $MnSO_4$)	0.5	—
Vitamin A and D oil	0.3	0.2
Niacin	—	1 mg./ 100 gms.

TABLE 4.—*Differences in vitamin B_{12} potency of some feedstuffs and concentrates obtained by chick and microbiological assays*

Material assayed	No. tests (12 chicks per test)	Vitamin B_{12} potency	
		Chick	Microbiological[3]
		Micrograms per gram	
Commercial B_{12} concentrate B	16	5.8–11.6	5.24
Commercial B_{12} concentrate C	3	6.9–12.9	2.90
2-unit liver extract	7	4.00	2.70
Liver powder 1:20	4	5.74	0.58
Fish solubles A	6	0.98	0.12
Fish solubles B	4	0.75	0.38
Fish solubles C	5	0.39	0.14
Norway Herring fish solubles	7	0.57	0.28
Homogenized condensed fish	6	0.81	0.10
Menhaden fish meal	6	0.24	0.06
Meat meal No. 3	4	0.08	0.04
Meat and bone scrap No. 2	4	0.16	0.06
Concentrated grass juice	3	0.08	0.01
ERRL P90-4[4]	1	0.27	1.10
ERRL P90-5[4]	1	2.10	3.90
ERRL P90-23[4]	2	2.18	3.80
Egg yolk, fresh	—	—	0.03

[1] See footnote (4) in Table 3.
[2] See footnote (5) in Table 3.

TABLE 3.—*Similarity in vitamin B_{12} potency of some feedstuffs and concentrates obtained by chick and microbiological assays*

Material assayed	No. tests (12 chicks per test)	Vitamin B_{12} potency	
		Chick	Microbiological[4]
		Micrograms per gram	
Crab meal	4	0.33	0.45
King crab meal	2	0.56	0.62
Herring fish meal No. 1	3	0.23	0.27
Herring fish meal No. 3	3	0.18	0.19
Salmon fish meal No. 2	4	0.09	0.14
Tuna fish meal No. 5	2	0.10	0.19
Tuna fish meal No. 8	3	0.18	0.13
Sardine fish meal No. 9	3	0.23	0.17
Steam fish meal No. 10	3	0.15	0.16
Whale solubles No. 2	3	0.06	0.04
Liver substance defatted	8	0.69	0.90
Broiler viscera meal	3	0.18	0.20
R-1[1]	2	0.64	0.61
Commercial B_{12} concentrate E	6	2.26	3.30
Acid precipitate[2]	4	5.80	6.20
ERRL P90-79-1[3]	2	2.40	2.40
ERRL P90-79-2[3]	2	1.90	1.90
Feather protein	1	0.02	0.02
Skim milk, dried	9	0.06	0.03
Whey, dried, sample No. 2	5	0.03	0.01
Whey, dried, sample No. 3	2	0.02	0.03

[1] A fermentation by-product of vitamin B_{12} manufacture.
[2] Acid precipitate of water extract of cow manure.
[3] Sewage sludge preparations.
[4] Each value represents an average of 3 or more trials.

8.42

from the Irish Sea contained amounts of cadmium ranging from 0.032 to 0.075 μgm. /kgm. (mean 0.055 ± 0.012 μgm./kgm. or 0.49 μgm.-atoms/ton). This is lower than the concentrations of either zinc or mercury in the sea (c. 80 and 1.5 μgm. -atoms/ton respectively) and is somewhat less than was predicted by Buljan.

Further work is proceeding on the seasonal variation of cadmium in the sea and on its concentration by marine algae.

2.01 THE PROBLEM OF THE STERILITY OF THE MUSCLES OF LIVING FRESHWATER FISH

Maltschewsky, N. and Partmann, W.
Arch. Mikrobiol. 16, 252-69 (1951)
Food Science Abstracts 26, No. 4, 387 (July 1954)

The isolation and examination of the properties of the bacteria from the skin, muscles, and surface slime of living fish were undertaken; the morphological and physiological properties of the organisms are described. Of 31 samples of muscle from several different fish, only 5 were sterile. There was no special relation between the type of micro-organism and the position of the muscles, or between different fish, the bacterial contamination of the water, or the type of infection. The organisms isolated grew especially well on fish bouillon. The bacterial strains isolated from the muscles 1 hour after death were similar, but differed appreciably from those which occurred in the water, soil, or air, as well as from the fish pathogens. In general, they were weakly proteolytic and were characterized by polymorphism.

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2.5 LIVE LOBSTERS SHIPPED BY AIR IN NEW PACKAGE

Anonymous
Food Engineering 26, No. 9, 198 (September 1954)

Live lobsters can now be transported to their destination in specially-designed leak-proof light-weight corregated boxes that are economically suitable for air shipment. The new corregated box is equipped with cushioning pads for the top, bottom, and sides; a pair of paraffined trays; and a series of water-absorbent pads.

Before the live lobsters are placed in the box a pad is placed on the bottom to cushion the shipment, a water-absorbent pad is added, and cushioning liners are placed around the sides. A paraffined tray and three more absorbent pads are now placed in the bottom of the box. Fifty pounds of live lobsters are then packed in the box with a fourth absorbent pad on top. This pad is covered with seaweed, a layer of cracked ice, an ice preservative, a fifth absorbent pad, a second paraffined tray, and a final cushioning pad before the box is closed. Shipments requiring up to 40 hours to deliver have been made without leakage of the corregated box or damage to the lobsters.

A smaller corregated box has been planned for consumer use. It will be equipped with a carry-home handle and will hold 8 or 9 chicken lobsters for over-the-counter sales or short trips. The live lobster pack is currently in use for shipments originating in Boston.

ABSTRACTER: Martin Heerdt

2.01 THE PRESERVATION OF "WET" FISH

Riemann, H. and Bramsnaes, F.
FAO Fisheries Bulletin 7, No. 2, 49-65 (April-June 1954)

Bacterial activity is the most important factor in the spoilage of wet fish. However, chemical changes in the fat and autolysis also may be important. Most of the preservation studies have been concerned with bacterial spoilage because codfish and related species have been the most common subjects of research. Autolysis and the development of rancidity are not particularly evident in the spoilage of codfish as they are in the spoilage of fatty fish.

The bacteria associated with the spoilage of chilled fish are the so-called cold-loving species; they remain active even at temperatures as low as 32° F. However, these bacteria are markedly inhibited by a small decrease in temperature in the range 32 to 33° F: Codfish have been found to spoil twice as fast at 37° F. as they do at 32° F. This factor has not received adequate attention in the practical handling and storage of fish. The temperature of commercial fish (codfish) aboard fishing boats may be as high as 44° F. because of a lack of close contact with the ice or not enough ice. Considerable amounts of ice may be saved if the hold is insulated or equipped with artificial cooling. Finely crushed ice, because of its greater surface as compared with coarse ice, cools the fish more rapidly. If the quantity of ice is less than 75% of the mass of fish being cooled, the time required for cooling is prolonged. If only 25% ice is used, proper holding temperature is never reached. It is general knowledge that fish should be iced as soon as possible after catching. Storage without ice on deck may increase the temperature of the fish markedly and shorten its keeping quality in ice by several days.

Most fish are gutted and washed before storage, reportedly to enhance their keeping quality, but there is very little published data to support this claim. Round fish may have a lower spoilage product

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ABSTRACTER: Martin Heerdt

2.01 MICROBIOLOGICAL DETERMINATIONS OF FISH POST MORTEM, ITS DETECTION AND CONTROL

Tarr, H. L. A.
Bacteriological Reviews (March 1954)
Food Engineering 26, No. 9, 207-208 (September 1954) ("Detection and Control of Fish Spoilage")

The spoilage of fresh fish is primarily caused by the bacteria that live in the digestive tract and in the surface slime of the fish. In contrast, the flesh and internal organs of fish have been shown to be bacterially sterile. Fish muscle contains about 80% water and a high percentage of water-soluble proteins and nitrogenous nutrients in which bacteria can grow. The marine bacteria that are associated with fish will grow at temperatures as low as 18.5° - 23.5° F. Optimum growth however, occurs in the range 25° - 41° F. Fish spoil twice as fast at 36.5° F. as they do at 30.2° F. The best way to keep fish fresh, therefore, is to store them as close to their freezing point (30° F.) as is possible.

The presence of cold-loving bacteria causes fish to spoil more rapidly in cold storage than beef, which has a higher proportion of medium-temperature-loving bacteria. After death, fish muscle usually has a pH of 6.0 - 6.6 or one that is somewhat higher than the pH of beef. As spoilage proceeds, however, the pH of fish muscle rises due to the formation of volatile bases. Artificial attempts to lower the pH of fish to delay the onset of spoilage have not been successful because the isoelectric point of fish muscle proteins, which are highly buffered, is only slightly below pH 6.0.

Ultraviolet irradiation has been tried as a means of preserving fish. However, this form of light does not penetrate deep enough to effect sterilization. Ionizing irradiation does show promise as a means for sterilizing fish. Of the preservative compounds for retarding the spoilage of fish, sodium chloride is the most effective salt, except for the fact that it does not prevent the growth of

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ABSTRACTER: Martin Heerdt

BACTERIA IN FRESH-WATER FISH

FRESH FISH PRESERVATION

SHIPPING CONTAINER FOR LIVE LOBSTERS

SPOILAGE AND PRESERVATION OF FISH

2.01 (Cross References: 2.08, 3.12)

content than gutted fish because spoilage products (trimethylamine and volatile acids) which are produced in the intestines do not necessarily diffuse out into the flesh. For this reason, haddock and herring are usually handled in the round. Washing which removed 99% of the bacteria did not improve keeping quality. The ice itself may be a source of contamination for the fish, especially if it is stored for long periods in the hold and if new ice is piled on top of old ice. If the fish are filleted, however, sanitary conditions become very important. Fillets with an initial contamination of 10 bacteria per cc. may keep for 12 or 13 days at 38°F., whereas fillets with an initial contamination of 10^5 to 10^6 bacteria per cc. will not keep more than 4 days at 38°F.

Only a few preservatives have been found satisfactory for commercial application. Water may be effectively disinfected with chlorine or formaldehyde. Fishes such as halibut, cod, haddock, and sole, however, become discolored when subjected to water or ice containing small amounts of chlorine. Pseudomonas fluorescens can be effectively inhibited in halibut if the fish are dipped for 30 minutes in a 20% brine. Similarly, a handful of salt added to the belly cavity of stockfish prior to icing improves the keeping quality more than dipping in solutions of sodium nitrite, tannic acid, or quaternary ammonium compounds.

Carbon dioxide (40% or more) in conjunction with normal storage in ice, effectively inhibits bacterial growth. Many chemical preservatives other than nitrite and hydroxylamine have been tried as growth inhibitors of bacteria in fish. Varying results have been obtained. As a rule, however, most preservatives exert a greater effect in slightly acid media than in neutral or alkaline media. It is difficult, however, to lower the pH of fish flesh without damaging the flavor, appearance, or consistency. The bacterial growth-inhibiting effect of nitrite (200 p. p. m. or below) is pronounced at pH 6.0 but is not significant at pH 7.0. Nitrite in fish flesh is reduced and disappears in storage. Present knowledge regarding the toxicity of hydroxylamine, which has more pronounced growth-inhibiting effect than nitrite, is too limited to permit use of this compound as a preservative.

There are 109 references cited.

2.01

halophilic organisms. Nitrites also are cheap and effective as preservatives for fish. Smoking has some value as a preservative because of the phenolic compounds that are deposited on the surface of the fish.

A number of different tests may be used for estimating the degree of spoilage in fish. These are as follows: bacterial numbers, volatile bases, trimethylamine, total volatile substances, indole, and organoleptic tests. All of these tests, however, require considerable judgment if they are to be interpreted correctly.

One hundred and thirty-two references are cited.

2.01 (Cross Reference: 0.5)

2.5 (Cross Reference: 1.87)

3.12 INHIBITION OF MOULD DEVELOPMENT IN FISH PRODUCTS

Boyd, J. W. and Tarr, H. L. A.
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 99, 22-23 (July 1954)

Until recently the only reliable measures for inhibiting mold growth in fish products were adequate plant sanitation and storage at low temperatures (30° F.). Dun mold infection, which occurs in salted fish, may be controlled by mold inhibitors such as propionic acid or by a mixture of sodium benzoate and sodium acid phosphate. These procedures, however, have not been adopted commercially. Sorbic acid recently has been re-established as an efficient and innocuous mold inhibitor. This acid, which is very closely related to caproic acid, is virtually harmless as a food additive.

The present work was initiated to determine if sorbic acid was an effective inhibitor of mold growth in fish and to determine if sorbic acid plus certain antibiotics would retard the development of red halophilic bacteria on salt fish. Pieces of fresh lingcod approximately 2 x 2 x 0.5 inches in size were "kench cure" salted, a standard dry-salting procedure, with each of the following ground into dairy salt in the concentration shown:

Sorbic acid 0.05, 0.1 and 0.2%
Sodium benzoate 0.05% + sodium dihydrogen phosphate 1%
Sodium benzoate 0.01% + sodium dihydrogen phosphate 1%
Sodium propionate 0.1%
Chlorotetracycline (aureomycin) 0.01 or 0.02%
Tetracycline 0.01 or 0.02%

Cured samples were stored for five days at 40° F. to allow for salt penetration after which

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 ABSTRACTER: Martin Heerdt

3.249 YELLOW DISCOLORATION IN FROZEN LOBSTER MEAT

Dyer, W. J. and Horne, D. C.
Fisheries Research Board of Canada, Atlantic Fish. exp. Sta., Circ. No. 2 (1953)
Food Science Abstracts 26, No. 3, 252 (May 1954)

The yellow discoloration, and the accompanying off-flavour, that develop in stored frozen lobster flesh, appear to be associated with the oxidation of the red pigment to a yellow one. The oxidation occurs especially in the tips of the claws, which have a higher fat content than the rest of the meat. Development of discoloration is rapid in the window and open-seam, push-cover types of can, neither of which should be used. The use of sealed cans, or vacuum pack cans, coupled with quick-freezing and storage at low temperatures, should prevent any discoloration. Anti-oxidants such as ascorbic acid may also be effective.

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3.60 PROGRESS IN MEAT DEHYDRATION

Furgal, H. P.
Food Engineering 26, No. 9, 74-76, 152 (September 1954)

The use of drying as a technique for preserving meat is prehistoric. Primitive man made use of the sun and wind to accomplish this purpose. Technological advance replaced sun and wind with the warm-air oven, but the relatively short shelf life and low palatability of the products produced by this method prevented the expansion of this activity.

After considerable investigation it became apparent that it would be difficult, if not impossible, to produce by means of the warm-air oven a dried meat product that would rehydrate well. At this point extended investigations were initiated into the use of freeze-drying or drying by sublimation.

Fundamentally, it consists of removal of water under high vacuum by sublimation from the solid phase (ice) into the gaseous phase (water-vapor).

There are four advantages of freeze-drying when considered for so unstable a product as meat:

1. Low temperature. Sub-freezing temperatures retard chemical, enzymatic, and bacterial activity. (Meat denatures on heating, causing chemical rearrangement to take place, thus altering flavor and making rehydration difficult).
2. No case-hardening. Since evaporation is directly from the frozen state with no liquid migration to the surface, a highly porous dry residue is left. In this way, lower moisture levels are possible, hence greater stability and greater ease of rehydration.
3. Little loss of volatile components. Since many volatile components decrease in vapor pressure at a greater rate than water, only small amounts of these valuable flavor and odor components are lost, even under high vacuums used.

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 ABSTRACTER: Kathryn L. Osterhaug

3.234 BRINE IMMERSION COOLING AND FREEZING OF READY-TO-COOK POULTRY

Esselen, W. B.; Levine, A. S.; Pflug, I. J.; and Davis, Lyle L.
Refrigerating Engineering 62, No. 7, 61-63, 100, 102 (July 1954)

The authors studied the feasibility of using various immersion media to cool and to freeze packaged, warm, eviscerated, ready-to-cook poultry. Packaging prior to cooling and then cooling and freezing in one step (1) minimizes contamination during handling, (2) reduces over-all handling and labor costs, (3) produces more rapid cooling than is obtained by either slush ice or air chilling, and (4) eliminates leaching of flavor which occurs during slush ice cooling. Brine immersion chilling should result in less shrinkage as compared with air-blast chilling, and in more uniform cooling, and a higher quality product as compared with slush ice or ice water cooling methods. Immersion cooling should also utilize refrigeration equipment more effectively.

The following classes of poultry were cooled experimentally: broilers, fowl, stags, young hen turkeys, and mature tom turkeys. All birds were dressed and eviscerated by handling procedures that resulted in the minimum loss of body heat prior to packaging. The temperature of the birds during cooling and the temperature of the cooling medium were measured at 5-minute intervals by 24-gauge copper-constantan thermocouples and a 24-point indicating electronic potentiometer.

The birds were packaged in moisture-vapor-resistant bags. Two thermocouples were passed through a hole in the bottom of the bag and located in the carcass of the bird. The bag was then vacuumized, sealed, and shrunk in the usual manner. Chilling and freezing data were obtained in the following cooling media: (1) slush ice at 33° F.; (2) water at 33° F.; (3) $CaCl_2$ brine at 23° F.; (4) $CaCl_2$ brine at 0° F.; and (5) $CaCl_2$ brine at -20° F.

(over)

 ABSTRACTER: Martin Heerdt

3.60

4. Sterility. Chemical, enzymatic, and bacterial activity is practically nil at low temperatures employed during freeze-drying. Low residual moisture prevents these reactions from resuming when the temperature is varied during the final drying stage.

Beef steaks and pork chops, as well as bulk and patty hamburgers, were dried experimentally in the laboratory using the following three types of equipment: plasma dryer, Stokes oven, and refrigerated drying oven.

In the plasma dryer, moisture is condensed on refrigerated coils within the dryer. It is possible to obtain a vacuum of approximately 200 mμ in this unit. Cost and limited capacity are serious drawbacks of this equipment.

In the Stokes oven, moisture is swept out and vaccum produced by a four-stage steam ejector. It is possible to obtain a vacuum of 500-700 mμ in this unit. Although the unit operates rather slowly, original cost is probably lower because of the simplicity of design.

In the refrigerated drying oven the vacuum is produced by oil pumps. Moisture is condensed on refrigerated coils located within the unit. A vacuum of approximately 300 mμ is obtainable.

All samples were pre-frozen at -10 to -30° F. Experimental drying ranged from 8 hours in the plasma dryer to a maximum of 72 hours in the large Stokes ovens. The latter was found to be far in excess of the drying time actually needed.

Previous tests have shown that a final moisture content of 2%, or less, is necessary for stability and resistance toward bacterial, enzymatic and chemical activity.

After drying, the meat was put up either in flexible packages or cans. It was found that a vacuum was necessary to preserve quality. By far the best storage results were with products stored in evacuated cans.

3.234

Chilling packaged broilers, 12-lb. packaged young hen turkeys, and 20-to 27-lb. packaged mature tom turkeys to 40° F. in a -20° F. brine required, respectively, 6, 35, and 45 minutes. The poultry packaged in moisture-vapor-resistant bags in each weight class cooled more slowly than did unpackaged birds. For a given cooling method and bird class, it took about 2 to 3 times as long to chill the packaged birds to 40° F. as it took to chill the unpackaged birds. However, packaged poultry chilled in low temperature brine compared favorably with the chilling of unwrapped birds in 33° F. slush ice to a 40° F. body temperature. Chilling eviscerated packaged poultry in -20° F. brine followed by holding at 36° F. offers a rapid and effective method for removing body heat from poultry prior to freezing or distribution in the fresh market.

Freezing packaged broilers, packaged 12-lb. turkeys, and packaged 25-lb. turkeys to 15° F. in a -20° F. brine required, respectively, 1 1/2, 5, and 7 hours. In those studies in which the birds were left in the lower temperature brines until frozen to a carcass temperature of approximately 15° F., it took approximately twice as long to freeze broilers and young hen turkeys in plastic bags as it did to freeze the unpackaged birds. However, it took only 5 hours to freeze packaged 12-lb. turkeys in -20° F. brine in contrast to the 60 hours required in some air freezing operations. The freezing time per pound of packaged bird in -20° F. brine was about 20 to 30 minutes.

3.12 (Cross References: 3.4, 3.5)

excess salt was removed by scraping. The samples were then sprayed with a 13% salt suspension of the spores of the mold (Sporendonema epizoum) which causes dun on salted fish, or with a mixture of red halophilic bacteria isolated from a typical sample of red salt fish and placed in sterilized covered glass dishes. Samples that had been inoculated with dun mold spores were stored at 77° F. and 75% relative humidity. Samples that had been inoculated with red halophilic bacteria were stored at 98° F. and 75% relative humidity. All of the samples were examined visually at intervals for each type of mold growth.

None of the substances incorporated in the dairy salt caused any appreciable decrease in the rate of red halophilic bacteria growth. Dun mold growth, however, was effectively inhibited only by sorbic acid. Samples that had received salt only developed dun mold growth after about 19 days, whereas samples that had received salt containing sorbic acid in any of the three concentrations used did not develop dun mold growth even after 32 days of storage Salt containing concentrations of 0.1% or more sorbic acid inhibited the growth of dun mold on the cured samples even after 60 days of storage. An attempt to culture dun molds from the latter samples indicated that dun molds were no longer present. The concentrations of sorbic acid found by spectrophotometric assay did not appear to decrease appreciably during storage for 11 days at 32° F. or 60 days at 77° F.

Experiments now in progress have been designed to determine the value of sorbic acid or sorbic acid plus chlorotetracycline (aureomycin) for inhibiting mold and bacterial growth in smoked fish. Sorbic acid is permitted in the United States as a preservative for fish in concentrations not exceeding 0.1%. At $2.00 per pound the cost of using it as a treatment for fish does not appear to be excessive.

3.12 SMOKE FLAVOR AND ASCORBIC ACID AS PRESERVATIVES FOR FATTY FISH

Erdman, Anna Marie; Watts, Betty M.; and Ellias, Loretta C.
Food Technology 8, No. 7, 320-323 (July 1954)

The authors tested an imitation hickory smoke flavor (liquid), alone and in combination with ascorbic acid, for its preservative effect on lightly-salted fatty fish held at 5° C.

Spanish mackerel (Scomberomorus maculatus) fillets were used in determining the preservative effect of the smoke on lightly-salted fatty fish. The fillets were rubbed with a mixture of 5% salt and 0.5% smoke or with salt alone, weighted down in enameled pans, and stored at 5° C. This concentration of smoke (0.5% of the weight of the prepared fish) gave a very strong smoke flavor which required partial removal by soaking if the fish were to be cooked and eaten. The antioxidant effect of the smoke is obvious from the range of peroxide values recorded in table 1 (this card, over). Off odors and flavors characterized by the terms stale, strong, or fishy, became noticeable at peroxide values ranging from 35 to 45 milliequivalents present per 1000 grams fat. No sign of bacterial spoilage was apparent in the smoke-treated samples even after 47 days, whereas the salt-treated controls had developed visible colonies and a slight putrefactive odor after 36 days of storage.

Striped mullet (Mugil cephalus), salted, was used to carry out the second series of tests in which the effect of ascorbic acid and low concentrations of smoke flavors was determined. The mullet were split rather than filleted so as to retain the peritoneal fat. These were rubbed with a mixture consisting of 5% dried salt, 0.1% imitation hickory smoke flavor (liquid), and 0.1% of ascorbic acid. The 4 variations required for interpretation of the results were as follows: (1) A control with salt alone, (2) salt plus ascorbic acid, (3) salt plus smoke, and (4) salt, smoke and ascorbic acid combined.

(over)

 ABSTRACTER: Martin Heerdt

1.0142 REPORT OF THE DANISH FISHING INDUSTRY FOR 1953

Anonymous
Fisheries Report for the Year 1953, 7-10

This is a report on the Danish fishing industry for 1953. The total number of fishermen employed was 17,232 as compared with 17,878 in 1952. The number of permanently employed fishermen declined from 13,217 to 12,581. The fishing fleet consisted of 13,967 boats of which 7,766 were equipped with an engine; 13 were above 50 tons gross, 1,323 were between 50 and 15 tons gross, and 2,261 were between 15 and 5 tons gross; all of the remaining boats were below 5 tons gross. The total value of the fishing fleet was estimated at 163 million Danish crowns, the gear at 71 million crowns, and the sheds for storing gear at 4 million crowns. The total 1953 catch of fish, crustaceans, and mollusks was 328 million kg., valued at 191 million crowns. This compares with 309 million kg., valued at 186 million crowns in 1952.

The increase in the total catch for 1953 was due entirely to a 35-million-kilogram increase in fish taken for reduction purposes. The value of the fish caught for reduction increased by 13 million crowns, whereas the value of fish sold for food consumption decreased by 7 million crowns. The 1953 herring catch was 5 million kg. smaller and valued at 2 million crowns less than in 1952. The decline in the codfish catch was 4 million kg. at a value of 1 million crowns. The mackerel catch was about 10% below the previous year and 87% of these fish were taken in the Kattegat and Skagerrak. Practically the whole catch of mackerel was taken in waters adjoining Denmark proper.

Total production of fresh-water trout for export was about 2.9 million kg. valued at 17.2 million crowns as compared with 2.8 million kg. valued at 15.7 million crowns in 1952. Only small quantities were sold in the Danish market. About 4 million oysters were taken and sold during the 1953-54

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 ABSTRACTER: Martin Heerdt

1.87 THE LOBSTER. PART I

Dewberry, Elliot B.
Food Manufacture XXIX, No. 9, 353-357 (September 1954)

The European and American lobsters are the most valuable of the several species. Homarus vulgaris, the European lobster, abounds in the coastal waters around the British Isles and the western coast of Europe from Norway to the Mediterranean. It does not inhabit the Baltic and is not common in the Mediterranean. It is limited in its eastern range by the Adriatic Sea.

Other European species include the "Norway lobster" or "Dublin prawn", Nephrops norvegicus, which inhabits the deep waters of the Irish Sea, the North Sea, and the coastal waters around Norway; and the spiny or rock lobster, also known as the sea crawfish, Palinurus vulgaris, which inhabits the waters around the south and southwest coasts of England and Ireland and is common off the French coast and in the Mediterranean. All European lobsters are marketed alive.

The American lobster, Homarus americanus, is found in the waters of the east coast of North America from Straits of Belle Isle (Labrador) to Cape Hatteras. The most important fisheries are situated off the shores of the Canadian Maritime Provinces. Canada's annual lobster catch amounts to some 30 million pounds. At one time the greater part of the catch was canned, but in recent years more and more of it has been marketed alive. About 50 percent of the catch is being canned at the present time.

The South African Cape rock or spiny lobster, Jasus lalandii, abounds in a restricted area along the southwestern Cape coast. They constitute one of the Union's important and valuable export commodities. In recent years there has been much interest in the canning and freezing of the lobster tails.

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 ABSTRACTER: Kathryn L. Osterhaug

2.08 FRENCH TUNA VESSELS USING SALT-WATER ICE

Anonymous
Fishery Information Bulletin, National Canners Association, 228 (October 8, 1954)

The use of salt-water ice to preserve the catches of tuna vessels and trawlers operating out of ports on the Isle d'Yeu in France has been reported. A French firm built a plant for the manufacture of ice from sea water adjacent to this port in the fall of 1953. As a result of the severe weather conditions prevailing on the nearby fishing grounds at that time, a thorough test of the efficacy of salt-water ice was possible.

One tuna sailing vessel, carrying 13 tons of this type of ice, caught substantial quantities of tuna the last few days of August, 1954. Tornadoes sweeping the area prevented the vessel from docking at a port. Although the fish had been in ice for 27 days when landed, the cannery manager judged the entire load acceptable for processing. The eyes of the fish were bright and the meat firm.

Other reports of tuna catches stored aboard the vessels 14 days in sea-water ice showed that the temperature in the muscle area of the tail section on landing was 32° F. for fish weighing approximately 12 pounds each. A vessel using regular ice on an 18-day trip had tuna aboard that showed a temperature of approximately 46° F. for the same size fish.

A trawler, carrying both regular and sea-water ice, had small gurnards aboard after five days in regular ice at meat temperatures of approximately 39° F. This species, stored in salt-water ice, had meat temperatures of 37° F. after the same storage period.

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LIQUID SMOKE IN FISH PRESERVATION

LOBSTER FISHERIES

DANISH FISHING INDUSTRY REPORT FOR 1953

SALT-WATER ICE

1.87

Lobsters sometimes weigh as much as 15 pounds each, but the European lobster rarely exceeds 10 pounds. Those weighing between 3/4 lb. and 2 pounds, measuring 9 1/2-11 inches, are the most marketable.

Lobsters are in season all the year round, but are considered to be in the best condition during the summer months. They are captured in creels or pots constructed of wicker-work, hemispherical in shape, with a funnel-shaped top. Other patterns have a wooden base with vertical hoops covered with tar netting, with funnel-shaped eyes on each side, or at either end of the creel, permitting entrance to the lobster but preventing its escape. The pots are baited with pieces of fish and sunk to the sea bed by means of weights. They are put in comparatively deep water and may be shot singly or in fleets of 50. Cork floats are used to mark the position of the traps.

Lobsters which are not required for immediate disposal can be temporarily stored in perforated wooden containers which are floated in sheltered sea water until they are sent to market. Each container holds approximately 30 lobsters, each with its claws tied together to prevent injury. For longer storage, large concrete tanks are used into which a continuous supply of fresh sea water is pumped.

For marketing, live lobsters are packed, with tails doubled under the bodies, in ventilated wooden boxes with holes to allow for drainage. Suitable packing material, which may consist of wood shavings, dried bracken, peat litter, wood wool, or sawdust, is laid on the bottom of the box, between each layer of lobsters and across the top, to prevent movement of the contents and to protect against excessive cold or sudden changes in temperature. In hot weather, ice is placed on dry sacking at the bottom of the box and covered with dry bracken to prevent the melting ice from coming into contact with the lobsters.

Undersize lobsters and female lobsters carrying spawn ("berried" females) are protected by law.

2.08

Hake stored at sea in salt-water ice for two days and thereafter ashore in this ice in boxes at 32° F. storage for five days were adjudged excellent in appearance. The temperature of the meat was then as 33° F.

Some of the characteristics of the salt-water ice claimed as beneficial for fish preservation are:

(1) Ice melts at approximately 24° F.
(2) Melt water has salinity of 10-12 percent.
(3) Preservation of fresh-fish flavor that only sea-water ice can retain.

3.12 (Cross Reference: 3.4)

The mullet fillets were also weighted down in enameled pans and stored at 5° C. Peroxide values as determined on the fat obtained from the mullet at intervals of 10, 20, and 30 days appear in table 3, (below). Ascorbic acid alone provided no protection, whereas the combination of the smoke and ascorbic acid was extremely effective. Bacterial spoilage appeared in the controls and ascorbic acid-treated samples between the 10th and 20th days, and putrefactive and stale fish odors appeared at the end of 20 days. Incipient spoilage with a stale fish odor was markedly apparent in the smoke-treated samples at the end of 34 days, whereas only a minimum amount of incipient spoilage was apparent in the smoke and ascorbic acid-treated samples. Smoke concentrations of 0.08% decreased but did not stop growth of pure cultures of Staphylococcus aureus, Bacillus subtilis, and Proteus vulgaris, whereas concentrations of 0.4% proved toxic (table 4, omitted).

TABLE 3
Effect of ascorbic acid and smoke flavor on peroxide formation in mullet[1]

Treatment[2]	Peroxide values					
	10 days		20 days		34 days	
	Range[3]	Ave.	Range[3]	Ave.	Range[3]	Ave.
I Control (salt only)	30-142	83	90-202	156	....	....
II Ascorbic acid 0.1%	32-163	90	78-166	119	....	....
III Liquid smoke 0.1%	7.4-27	16.5	26-60	45	....	....
IV Ascorbic acid + smoke	0	0	0-19	5	2.7-20	11.4

[1] All mullet were rubbed with 5% dry salt and refrigerated at 5° C.
[2] Amounts specified based on weight of fish.
[3] Four fish were analyzed in each group.

TABLE 1
Effect of smoke flavor on keeping qualities of mackerel fillets[1]

Days of storage at 5° C.	Peroxide values				Organoleptic tests	
	Salt Alone		Salt + Smoke[2]		Salt Alone	Salt + Smoke[2]
	Range[3]	Ave.	Range[3]	Ave.		
19	15.8-83	56.5	5.8-8.5	7.3	Off odor and flavor especially in brown lateral line	Good odor
36	55-83	73	5.6-12.0	9.4	Strong stale odor, slight putrefaction. Bacterial colonies	Good odor No putrefaction
47	30-105	77	15.3-25.6	20.8	Heavy bacterial growth. Odor of putrefaction	Good odor No putrefaction

[1] All fillets were rubbed with 5% dry salt.
[2] Firmenich hickory smoke flavor, concentration of 0.5% of weight of fish, mixed with salt. At this concentration the smoke flavor is too strong if fish are cooked directly, but palatable after soaking for 20 minutes in cold water.
[3] Three fish were analyzed in each group.

1.0142 (Cross Reference: 9.2)

season as compared with 3.4 million in the previous season.

Landings from Swedish vessels in Danish ports during 1953 amounted to 22 million kg. valued at 9 million crowns. The greater part of these landings were herring which when sold in the Danish market were not distinguished from fish caught by Danish vessels.

The Danish fishing industry processed 48 million kg. of fresh fish, crustaceans, and molluscs in 1953 compared with 58 million kg. in 1952. Of this total about 24 million kg. were used to produce fish fillets, about 7 million kg. were smoked, and about 8.4 million kg. were canned.

The fish meal and oil industry used an estimated 160 million kg. of fish and fish offal in the production of some 31,000 tons of fish meal and about 12,000 tons of fish oil. Fish and fish offal used for feeding fresh-water trout and fur-bearing animals and for fish ensilage amounted to 70-75 million kg.

The 1953 exports of fresh fish totaled 92 million kg. of fish worth 151 million crowns, 8.8 million kg. of fish fillets worth 20.3 million crowns, and 10.8 million kg. of shellfish worth 4.2 million crowns.

The 1953 exports of processed fish totaled 2.9 million kg. of canned fish worth 13.5 million crowns, 9.7 million kg. of salt fish worth about 17 million crowns, 6.7 million kg. of herring oil worth 8.5 million crowns, and 12.1 million kg. of fish meal worth 13.5 million crowns.

The total import value of fresh fish and processed fish amounted to 16.3 and 16.4 million crowns, respectively. In addition, fish meal and herring oil valued at 8.4 million crowns, medicinal fish oil valued at 4.5 million crowns, and other kinds of fish oil valued at 15.1 million crowns were imported.

0.8 DESALTING SEA WATER BY FREEZING

Thompson, Thomas G. and Nelson, Kurt H. (Dept. of Oceanography, University of Washington)
Refrigerating Engineering 62, No. 7, 44-48, 90 (July 1954)

The most obvious means of obtaining fresh water from sea water is by distillation. Potable water may be obtained from sea water, however, by the use of refrigeration with about one-sixth the energy required for distillation. Sea ice as a source of fresh water has been known to the inhabitants of Arctic regions since time immemorial.

The authors attempted (1) to obtain quantitative information on the distribution of salts in ice formed by the freezing of sea water, (2) to determine the salinity of water obtained from the melting of such ice, and (3) to determine the quantity of the potable water produced.

To answer the first of the foregoing questions, the authors took cylinders of ice formed by holding sea water in 2 1/2 x 18-inch tubes in a freezer at 23° F., 5° F., and -49° F., respectively, until frozen and cut them into a number of discs. Each disc was then allowed to melt and the chloride concentration of the water obtained was determined. A slight decrease in chloride concentration occurred with each increase in the depth of the disc cut from the ice cores formed at 23° F. The reverse condition occurred in the ice cores frozen at +5° F. and -49° F. By discarding the unfrozen salt solution only 20 to 25 percent of the total salts in the initial volume of water were retained by the ice.

To answer the second of the foregoing questions, the chloride content of sea water frozen at different temperatures was determined after the ice had melted in situ. Glass cylinders 7.87 x 23.6 inches high, with a capacity of 4.75 gallons were used for freezing the sea water. After each 3.93-gallon sample was frozen, the cylinders were removed from the freezer and the ice allowed to melt

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 ABSTRACTER: Martin Heerdt

3.239 ICE PROPAGATION IN SYSTEMS OF BIOLOGICAL INTEREST. II. EFFECT OF SOLUTES AT RAPID COOLING RATES

Lusena, C. V. and Cook, W. H.
Archives of Biochemistry and Biophysics 50, No. 2, 243-251 (June 1954)

"Quick" freezing is thought to be less injurious to biological systems than slow freezing because smaller crystals are formed. The rate of heat removal and the rate of crystal formation are strongly influenced by physical factors. The relation between freezing damage and composition of intracellular solutes or extracellular suspending media has been studied by several investigators. Their observations suggest that the kind and concentration of solute might be major factors in controlling the freezing patterns of biological materials and thus in reducing harmful effects.

This paper reports on a study by a new dilatometric method of the effect of solutes on freezing behavior. The "dynamic" dilatometer permits the volume and temperature of the sample to be measured continuously at a constant rate of heat transfer. This is in contrast with an ordinary dilatometer in which the volume is measured after equilibrium has been attained at a constant temperature. By plotting volume change against temperature, the temperature at which ice was formed could be determined at various rates of cooling.

In each test, a 51-ml. aliquot of solution was thoroughly de-aerated and frozen. The manometric fluid was an oil (15 ml.) with a low pour point and viscosity. Because the time required to freeze the 51 ml. of solution varied with the concentration of solutes, rates of cooling were expressed as the temperature differential in degrees centigrade. A 51-ml. aliquot of water could be cooled 20° C. (from +5 to -15° C.) or heated through the same range in 75 minutes at 40° C. differential, and in 150 minutes at 25° C. differential.

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 ABSTRACTER: Kathryn L. Osterhaug

3.19 ELECTRONIC EQUIPMENT. I. HIGH FREQUENCY AND INFRA-RED

Summer, W.
Food 22, 4-7 (1953)
Food Science Abstracts 26, No. 3, 338 (May 1954)

The application of infra-red electronic equipment in the food industry is discussed. Radiations with wave-lengths of 14,000 to 80,000 Å are effective, and are directed or concentrated by iso-intensity or parabolic reflectors. Although infra-red radiation can be used for many purposes connected with heating and drying, heat is produced within the material and spreads outwards, e.g. a loaf of bread baked by infra-red radiation has a crust in the centre of the loaf. Infra-red radiations can be used for defrosting frozen foods. High frequency heating also produces heat within a body without overheating the surface. Poor conductors, such as foods, can be heated by dielectric means, the energy being generated between 2 electrodes, which form a condenser; the frequency used is about 13 Mc per sec. This method is applicable to the continuous dehydration of vegetables, cooking, the inhibition of moulds, disinfestation, the inactivation of enzymes, heat-sealing, etc.; it can also be used for defrosting frozen foods in bulk (e.g. barrels of frozen berries or eggs frozen in 5-lb. blocks).

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0.7 RELATION BETWEEN VITAMIN D AND B_{12}

Frolich, Allan (National Animal Experiment Station, Uppsala, Sweden)
Nature 174 No. 4427, 462-463 (September 4, 1954)

A relationship between the growth-stimulating effect of vitamin B_{12} and the calcium, iron, and vitamin D content of diets had been noted in previous experiments of the author. An experiment was set up using a diet in which protein was entirely from vegetable sources. Day-old White Leghorn chicks from non-depleted hens were fed this diet and, after one week were placed in 6 groups, each group further subdivided into 4 sub-groups of nine chicks each. They were then fed the same diet but with different vitamin D and vitamin B_{12} supplements. The experiment was continued for 3 weeks with the following results:

Table 2. Chick Growth and Feed Consumed per Unit Gain (until Four Weeks of Age)

Group No.	Vitamin D supplement: Cod liver oil* %	Vitamin D supplement: Deltafor D_3—400† %	Vitamin D supplement: Approx. I.U. per kgm diet	Vitamin B_{12} (µgm. per kgm. diet)	Gain‡: abs (gm.)	Gain‡: rel %	Feed per kgm. gain (kgm.)
1	0	0·05	200	0	128	100	3·06
2	0	0·05	200	30	134	105	3·01
3	0·4	0·1	640	0	110	86	3·45
4	0·4	0·1	640	30	141	110	3·03
5	0·4	0·8	1,400	0	106	83	3·29
6	0·4	0·8	1,400	30	144	113	3·04

* 1,000 I.U. vitamin A, 60 I.U. vitamin D per gm.
† 400 I.U. vitamin D_3 per gm.
‡ Gain between one and four weeks, average males-females.

(over)

 ABSTRACTER: M. E. Stansby

DESALTING SEA WATER BY FREEZING

HIGH FREQUENCY AND INFRARED

BIOPHYSICS OF FREEZING

RELATIONSHIP BETWEEN VITAMINS B_{12} AND D

6

0.7 (Cross References: 5.41, 5.6)

The two higher vitamin B-supplemented diets significantly depressed the growth when no vitamin B_{12} was present. When the diet was supplemented with vitamin B_{12} this effect was eliminated.

0.8

without draining off the unfrozen brine. Sea water frozen at 23° F. and then allowed to thaw contained at depths of 0.43, 9.80, and 18.94 inches, respectively, 0.90, 6.05, and 40.22 parts per thousand of chloride. Sea water frozen at 5° F. and then allowed to thaw contained at depths of 0.51, 9.96, and 19.29 inches, respectively, 0.44, 7.27, and 73.96 parts per thousand of chloride. Sea water frozen at -49° F. and then allowed to thaw contained at depths of 0.43, 9.80, and 18.94 inches, respectively, 0.52, 7.77, and 85.42 parts per thousand of chloride.

To answer the third of the foregoing questions, sea water was frozen to the desired temperature and the residual brine was drained from the ice. Containers filled with 5 liters of sea water were frozen at four different temperatures. Each container was then removed from the freezer and placed on a fraction collector. The results obtained were as follows: (1) 80% of the total solids present in the original 5 liters were confined to the first liter of water obtained from the melting ice. (2) 50% of the water was partially desalted and contained only 20% of the salts originally present in the sea water, and (3) 30% of the sea water or 1.5 liters had been sufficiently desalted to yield a potable water containing from 70 to 130 p.p.m. chloride or the equivalent of 136-234 p.p.m. total solids. The yield of potable water could be increased considerably by reprocessing the partially desalted water.

Two and one-half liters of sea water were stirred to determine the yield of ice particles and brine from water agitated while being frozen. Brine and ice were then quickly separated in a large chilled Buchner funnel by means of suction. At freezing temperatures above 25.7° F., the chloride concentration averaged about 4 parts per thousand of melted ice, whereas the amount of occluded salts increased considerably at temperatures below 25.7° F. The amount of chloride was reduced considerably by one washing of the ice particles. When the temperature of the ice and brine mixture reached 25.7° F. over 50% of the water in the original sea water had been transformed into ice. After losses from washing and discarding the first water from the melting ice, the yield of fresh water would be from 40 to 50%.

3.239

The performance of the instrument was checked by freezing distilled water. The volume expansion was within the range of reported values but about 5-10% higher than the most reliable value. However, since the equipment was used to determine the temperature at which freezing occurred rather than the percent water frozen at various temperatures, no correction was necessary.

Gelatin, sucrose, and glycerol solutions of various concentrations were frozen and thawed in the dilatometer at various temperature differentials in the presence and absence of nucleating agents. Insoluble hexagonal crystals of silver iodide or calcium carbonate were added to some solutions to provide nuclei at a higher temperature.

In concentrated solutions of gelatin, sucrose, and glycerol, crystal formation occurred at the freezing point at slow cooling rates, but below the freezing point at rapid cooling rates. Increasing either the concentration of solute, or the rate of cooling increased the difference between freezing point and temperature of freezing. Addition of hexagonal crystals of silver iodide and calcium carbonate raised the "critical nucleation temperature" and thereby the freezing temperature.

It is suggested that large ice crystals are formed when freezing occurs above the critical nucleation temperature. However, when freezing occurs at the critical nucleation temperature small ice crystals are formed, and under suitable conditions some water may not freeze. It is further concluded that the effect of solutes on nucleation and rate of crystal growth must be a major factor controlling the pattern of ice propagation.

6.190 FISH MEAL AS A FEED INGREDIENT

Bethke, R. M.
Feedstuffs 26, No. 33, 52, 55-56 (August 14, 1954)

The feed industry is interested in fish meal because (1) it supplies high quality protein that contains a liberal quantity of the essential amino acids, (2) it is a good source of vitamin B_{12} and other B complex vitamins, (3) it is a good source of an unknown growth factor (or factors) which are believed to be necessary for optimum growth and performance in certain animals, and (4) it also supplies a liberal quantity of calcium, phosphorus, and trace minerals.

Research has shown that the nutritional value of fish meal depends (1) upon the quality of the raw material from which it is made, and (2) upon the method of manufacture used to produce the meal. Processing does not materially improve the nutritive value of an inferior raw material. In addition, there is ample evidence to indicate that excessively high drying temperatures must be avoided if a high grade product is desired. Return of a part of or all of the solubles to the presscake or meal is a factor in improving the nutritive value of the final meal.

Considerable variation exists in the nutritive value of fish meals available on the market. Experience has shown that significant variation exists (1) in the protein value of the meals, and (2) in the vitamin B_{12} and unidentified factor content of different kinds of meals, as well as the same kind of meals.

Biological determinations based on rat feeding tests with fish meals made commercially from the same or different kinds of fish showed a marked difference in growth response even when the same amount of protein was supplied. Other data based on rat feeding tests showed variations in the feeding

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 ABSTRACTER: Martin Heerdt

6.139 THE EFFECTS OF HEAT UPON THE NUTRITIVE VALUE OF PROTEIN

Rice, E. E. and Beuk, J. F.
Adv. Food Res. 4, 233-279 (1953)
Food Science Abstracts 26, No. 3, 350 (May 1954)

Methods of determining protein quality, factors contributing to the biological value of protein, types of processing used for protein foods and feeding-stuffs, the effects of heat processing on the proteins in food, and the effects of storage on protein quality are discussed. In general, moderate heat treatments do not significantly alter the nutritive value of the protein, but when excessive heat is applied to protein-containing foods, damage to the protein may occur. The extent of such damage depends upon the intensity and duration of heat treatment and the susceptibility of the particular product. Pure, dry proteins are usually relatively resistant to change; products containing mixtures of proteins and carbohydrates are more readily damaged by heat. The changes have little nutritive significance in diets containing a variety of proteins of diverse origin. For live-stock, however, the majority of the protein intake may be supplied by protein concentrates (soya bean, cottonseed, linseed, meat, or fish meal) which have usually been subjected to rendering and drying processes; in such cases the use of overheated protein supplements does decrease the effectiveness of the ration. Decrease in protein quality may be attributed to one or more of the following causes: (1) actual destruction of one or more essential amino acid, (2) formation of inter- or intramolecular bonds which are resistant to digestion, (3) alteration in the rate at which the various amino acids are released from the protein, resulting in mixtures of amino acids less efficient for metabolism and assimilation. A decrease in palatability caused by overheating of the food may result in decreased intake. Heat, properly applied, is essential to many processing operations, and in relatively few cases does it result in a serious decrease in nutritive value; heat processes should, however, be kept to a practical minimum.

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6.3 THE MANY USES OF IRISH MOSS

Rhydwen, Wyn
Trade News (Canada) 7, No. 2, 8-9 (August 1954)

The harvesting of Irish moss earned fishermen and workers of the Maritime Provinces almost $300,000 in 1953. This industry was born of World War II when the United States was no longer able to import its supplies from Europe. Turning to Canada's Maritime Provinces, abundant supplies were found on Prince Edward Island and around Yarmouth in Nova Scotia.

The moss is found growing from just above low water level down to a depth of about 20 feet. It may be recognized by its narrow, flattened leaf which branches again and again to form a clump. The color varies from dark red-brown to light green.

The moss is easy to harvest and may be raked or picked by hand. In some areas it is often collected by the wagonload after it has been washed up on the shore by storms. Rakes with close-set teeth and with handles from 15 to 20 feet long are used. An experienced man can pick as much as 400 pounds of Irish moss in an hour. Usually gathered in bags by the harvesters, the crop is taken to a central collection point for drying, and sometimes bleaching, before it is baled for shipment to the extraction plants. Most of these plants are in the United States, although there are a few small ones in Canada.

Recognizing the need to maintain a high quality moss in order to hold the market against competition from other countries, the collection firms have voluntarily accepted inspection of the moss before shipment. Grade "A" moss requires it be 92 1/2 percent moss, with a maximum of 5 percent foreign material and 2 1/2 percent sand or shell, and a moisture content of not more than 18 percent.

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 ABSTRACTER: Roy C. Stevens

6.54 FAO'S WORK ON THE UTILIZATION OF FISH MEAL IN THE HUMAN DIET

Anonymous
FAO Fisheries Bulletin VII, No. 3, 120-122 (July-September 1954)

One of the tasks of the FAO (Food and Agriculture Organization of the United Nations) is to encourage the production of cheap animal proteins in economically underdeveloped countries. If the proteins have to be processed to make them more suitable for transportation, storage and distribution, the processing must also be cheap.

In this category is edible fish meal, or fish flour. Fish meal contains 60 to 85 percent protein, and if made from fresh fish or offal and properly processed, it will have high biological value. In addition, it will contain important nutrients like available calcium, phosphates, and B vitamins.

The main difficulty in utilizing fish meals in the human diet is their flavor, which easily becomes rancid and too "fishy" for consumers in certain regions, although in other regions the consumers do not object to a strong fish flavor, if it is of the type to which they are accustomed.

Among those countries in which consumers prefer stronger fish flavors are Southeast and East Asia, and Equatorial Africa. In some of these areas locally accepted fish meals are produced on a small scale, without foreign assistance. Angola has a highly developed fish flour industry, organized mainly in cooperatives. Local developments are also taking place in Thailand and the Philippines.

In countries where people object to strong fish flavors, fish meal until now has not been produced for human consumption. In such countries fish meals would have to be refined, deodorized, or

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 ABSTRACTER: Roy C. Stevens

FISH MEAL AS A FEED INGREDIENT

EFFECTS OF HEAT ON PROTEIN

CANADIAN IRISH MOSS

EDIBLE FISH FLOUR

6.139 (Cross Reference: 0.7)

6.54

manufactured in such a way that the final product would be flavorless or practically without fish flavor. Deodorized fish flours have been produced experimentally in the Union of South Africa, the United States, and in Europe. Although these fish flours have proved to be acceptable, there is still either insufficient information on them or they are too expensive for the purpose. Production costs higher than about 25 cents per kilogram would probably make the product too expensive for use as a cheap protein supplement to foods in economically underdeveloped countries.

The first experiment with flavorless fish flour has been completed successfully in Chile. One hundred and forty school children from 5 to 14 years of age received each day for six weeks, as part of their school lunch, a 90-gram bread roll made at a commercial bakery which used flour containing 10 percent fish flour. The bread was only slightly darker than normal bread, and smell, taste, form, and consistency of crust and crumb were normal. Acceptance was good. There was not a single case of rejection or complaint, and no digestive trouble traceable to the bread occurred. The 6.1 grams fish flour in each bread roll provided the child with a daily supplement of 4.4 grams protein, 335 mg. calcium, 329 mg. phosphorus, and 3 mg. iron, whereas the roll itself supplied 6.5 grams protein.

Similar trials will soon be conducted in other countries.

6.190

value of fish meals which served as a source of vitamin B_{12} and the unidentified factor. In both of these tests the differences between the meals was primarily a measure of their vitamin B_{12} and unidentified factor content. Even when vitamin B_{12} was added to rations containing fish meal, a significant variation was found between meals. When chicks were used as the test animals, the variation between meals was not as great as when rats were used. It is the opionion of the author that this lesser response is probably due to the unidentified factor content of the meals rather than to the vitamin B_{12} content.

6.3

The extract from Irish moss, carrageenin, has many uses in the food industry and other industries as well. It is used as a stabilizer in chocolate milk, ice cream, pudding powders, hand lotions, shoe polishes, shaving cream, cough medicine, etc. It is also used in leather dressings, as a size for cloth, a thickener for colors in calico printing, in candy, and for the clearing of beer.

4.61 CONTRIBUTION TO AN ELUCIDATION OF THE MECHANISM OF ACTION OF ASCORBIC ACID USED AS AN ANTI-OXIDANT IN FROZEN FISH

Thorsteinsson, T.
Fiskeriminist. Forsogslab., 1952, 31 pp.
Food Science Abstracts 26, No. 1, 23 (January 1954)

When fish are dipped in a 1 to 2% ascorbic acid solution, the outer layer absorbs, on average, about 0.1% of ascorbic acid. This delays the development of rancidity in proportion to the time required for the ascorbic acid to be broken down; experiments with raw and cooked fish indicated that enzymes are involved in this breakdown. Dehydroascorbic acid is also effective, but the breakdown of ascorbic acid occurs without its accumulation. No reduction of dehydroascorbic could be observed in fish tissue. When cysteine is added, it acts as a reducing agent in the ascorbic acid-dehydro-ascorbic acid system, and the effect is proportional to its molar equivalent of oxygen. The presence of salt accelerates the breakdown of ascorbic acid, and correspondingly shortens the induction period. Under certain conditions, in a salt-containing medium, ascorbic acid acts as a pro-oxidant. Peroxide formation in fish oil is of enzymic nature. A number of enzyme systems are probably involved in the development of rancidity. If substances are present which increase and prolong the consumption of oxygen by the tissues, due to enzymic action, the formation of peroxides is retarded. This effect and the action of ascorbic acid, can probably be explained by competition between the various oxidative processes.

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3.33 THE LOBSTER. PART II. CANNING

Dewberry, Elliot B.
Food Manufacture XXIX, No. 10, 391-395 (October 1954)

Lobster canning in Canada is conducted only by permit from the Department of Fisheries and all cannieries are subject to periodical inspection by departmental officers.

Live lobsters are graded aboard the fishing vessels according to size. Those over nine inches are usually reserved for sale as "live" lobsters. Those of nine inches and under (to the legal size limit in that area) are transferred to collecting boats, taken ashore, and unloaded into trucks for transportation to the canneries. It is essential that the lobsters are carefully handled and kept moist during these operations, since only live, healthy, vigorous crustaceans make a first quality canned product. At the canneries the lobsters are kept alive in tanks of circulating sea water until required.

The lobsters are cooked in boiling sea water or by live steam for eight to fifteen minutes. Immediately after cooking, they are placed on tables and sprayed with clean cold water, drained, and passed to the preparation tables. Each lobster is divided into claws and arms, body and tail, the meat from the arms being picked out with a small knife.

On picking, the meat from each section of the lobster is kept separate and washed thoroughly in clean running water for the removal of clotted blood, etc. Only the meat from claws, arms, and tail is canned. Remaining portions, such as the meat from the breast and thumbs, together with the liver, are manufactured into lobster paste. The lobster bodies are ground, packed in tins, and sold as silver fox feed. The offal is used as fertilizer.

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ABSTRACTER: Roy C. Stevens

3.239 DRIP FORMATION IN MEAT AND FISH

Empey, W. A. and Howard, A.
Food Preservation Quarterly 14, No. 2, 33-36 (June 1954)

"Drip is defined as that portion of the liquid phase or muscle juice which exudes during or after thawing from cut surfaces of previously frozen muscles." Drip can be measured by natural flow and/or by absorbing the liquid from sections of minced muscle with absorbent paper or by exudation into a medium such as petroleum ether.

Some of the factors which influence drip are:

1. Time and temperature of holding the muscle before freezing.
2. Rate of freezing, especially in relation to the time taken to pass the muscle through the "critical temperature zone" (-1°C. to -5°C.).
3. Time and temperature in the frozen state.
4. Rate of thawing.
5. Storage after thawing.
6. Hydrogen ion concentration in the muscle -- the amount of drip from thawed muscle (meat) decreases as the pH is increased from the range 5.3 - 5.5 to above 6.0 and becoming almost negligible at about 6.4; in some fish muscles, however, appreciable drip is found at between 6.2 and 6.4 pH.
7. Osmotic pressure. Drip may be reduced or eliminated by increasing osmotic pressure in the muscle by the addition of about 1 percent by weight of sodium chloride before freezing.
8. Type of muscle. The amount of drip is influenced by the percentages of fat, water, and connective tissues in the muscle.
9. Species. Drip may be greater from the coarse-textured fish species than from the finer-textured species.

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ABSTRACTER: D. T. Miyauchi

3.9 JELLIED EELS IN ASPIC

Anonymous
Food Manufacture 29, No. 10, 397,405 (October 1954)

Live eels are kept in submerged perforated tanks from which they are transported to the processors as required. They are shipped in wooden boxes or in trucks equipped with oxygenated tanks.

In the factory described, a production line system has been set up in which the live eels are killed, cleaned, and prepared for boiling within ten minutes of their arrival. Measured quantities of salt and gelatin are placed in each pan before the eel cutlets are added. The time of boiling varies according to the species and size of the eel.

During the boiling operation, the fat is skimmed off, after which the cutlets are strained and placed in shallow trays for cooling. The cooled cutlets are then conveyed to stainless steel tables in the packing room, where they are placed in cartons or cans. Aspic is added, and after further cooling, the capped and crated cartons or cans are placed in refrigerated storage.

The canned product has a storage life of several weeks, and the cartons about one week, depending largely upon the cleanliness of conditions in handling and processing.

ABSTRACTER: Roy C. Stevens

3.239

Trauma, dehydration, and denaturation are the three theories advanced to account for drip. "The evidence put forward suggests that drip is due in part to structural changes brought about by the formation of ice and in part to the development of denaturation in the proteins which normally tend to hold the water of the muscle." Denaturation appears to be bound up with dehydration brought about by ice formation.

The authors point out the conflicting opinions between different investigators concerning the relative influence of different factors on the extent of drip. For future investigations the authors suggest the following:

1. Standardization of methods for measurement of drip.
2. A reinvestigation of factors known to influence drip, in conjunction with (a) studies of the composition of drip, (b) studies of frozen and thawed muscle with an electron microscope for changes in the muscle, (c) studies of methods for detection of early stages of denaturation in muscle protein.
3. Investigate the raising of pH and/or osmotic pressure within the muscle fibres to reduce drip.
4. Investigate new factors influencing drip, such as the state of "liberation" of water at various stages of rigor prior to freezing and during thawing.

Results of recent studies in Australia, New Zealand, and United Kingdom indicate that:

1. Drip losses from beef muscles frozen rapidly are only slightly less than those frozen slowly in accordance with commercial practice.
2. In any one muscle, there is a definite decrease in drip with increase in fat content.
3. Drip is almost negligible when muscle pH is 6.3 or higher but varies widely in the normal range of 5.3 to 5.8.
4. Difference in fat content, in rates of freezing, and in normal pH range of 5.3 to 5.8 are insufficient to account for all the variation in drip in different muscles from one carcass and in corresponding muscles from different carcasses.
5. Fish muscle frozen rapidly has less drip than those frozen slowly, and the addition of salt to the fish muscle reduces drip.

3.33 (Cross Reference: 1.87)

Three sizes of cans are used for packing lobster in accordance with government regulations. These are three ounces, six ounces and twelve ounces. The cans are lacquered and have parchment liners, which are inserted just before the meat is placed in the can. The meats are packed by one of two methods. In the "coil" pack, the tails are placed in the can standing on their side with the red pigmented backs facing towards the outside. The red tip of each tail overlaps the torn white body end of the next tail. In the "cup" pack, the tails are arranged so that the red tip overlaps the torn white body ends as above, but the tails are twisted downwards and inwards towards the center of the can so that they do not stand on their sides. The arm meat is used to fill the center of the can. The claws are arranged in "sardine" fashion with the darker side up, using alternatively right-and left-hand claws. An eight percent sodium chloride brine is added which gives a final concentration of about two percent salt in the canned lobster. The parchment liners are then folded over the top of the can.

Each batch of unsealed cans is placed in an exhaust box of the water bath or steam type at 212° F. This obviates the formation of "flippers" or "springers," and reduces strain on the seams of the can during processing, and also on the chemical changes causing deterioration in color and flavor during storage.

The cans are sealed while still hot, and are then processed in retorts at 239° F. for 25, 29, or 40 minutes respectively, for the 3, 6, and 12-ounce cans.

After processing, the cans are immediately cooled to 100° F., either by applying cold water while they are still in the retort, or by immersion in, or spraying with, cold water. When cooled and labeled, the cans are packed in wooden cases containing ninety-six six-ounce or forty-eight twelve-ounce cans, half cases being used for the three-ounce cans.

1.2 HERRING INDUSTRY REPORT

Anonymous
Food Manufacture 29, No. 10, 382-383 (October 1954)

According to the Annual Report of the Herring Industry Board (Great Britain), the demand for fresh herring for the home market, which began to decline in 1952, fell to a new post-war low level in 1953. The sale of kippers suffered similar decline. Among the reasons advanced to explain the falling demand for herring on the part of the consumer are: (1) the present high prices compared with those of prewar; (2) the indifferent quality of the herring and kippers reaching the market; (3) the increasing availability of other protein foods; and (4) the trend towards more easily prepared meals.

Of all these factors, that of availability of other foodstuffs is considered to be the one that has had the greatest effect on herring and kippered sales.

In the field of research and development, the Board has completed investigations into the pre-treatment of herring in cans and the assessment of the liquid from the cooked fish. Other items of research have been concerned with the construction of an automatic brining, filtration, and rejuvenation unit suitable for use in herring canning, biological studies of herring used for canning, transport ability tests with cartons of frozen herring and kippers, the preparation, for consumer tests, of canned herring processed by various methods and packed with different types of tomato sauce, and the development of an improved pack of canned herring with curry sauce for a particular market.

 ABSTRACTER: Roy C. Stevens

4.64 THE HIGHER ALKYL GALLATES

van Sluis, K. J. H.
Food Manufacture XXIX, No. 10, 401-405 (October 1954)

The examination of results of an extensive series of antioxidant evaluation tests indicate that the gallic esters of the higher fatty alcohols offer several advantages over the lower gallates. Their solubility in oils and fats is much higher than that of the lower gallates, while the appearance of violet discolorations upon contact with iron or iron salts is far less.

In addition, the higher alkyl gallates, particularly dodecyl gallate, not only stabilize the fatty material itself but also the food products that contain them. In this respect, they are said to be superior to propyl gallate. Finally, the higher gallates do not produce that secondary taste said to be nearly always perceptible when some other antioxidants are used.

The storage life of untreated beef fat is normally about five months, whereas experiments have demonstrated that the addition of the higher alkyl gallates will extend the storage life by about three years. The rancidity figures were obtained by means of the Swift stability test, which accelerates oxidation and provides reliable data in a matter of hours or days that otherwise would take months or years.

The gallic esters are practically insoluble in water, moderately soluble in 30 percent ethanol, and readily soluble in 90 percent ethanol. They may be emulsified in water at 80° C. and are readily soluble in warm glycerol, oils, and fats.

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 ABSTRACTER: Roy C. Stevens

4.64 THE USE OF ASCORBIC ACID IN PROCESSING FOODS

Bauernfeind, J. C.
Avd. Food Res. 4, 359-431 (1953)
Food Science Abstracts 26, No. 3, 352 (May 1954)

Ascorbic acid is an oxygen acceptor, and through its ability to accept oxygen from the air the usual oxidation path is delayed. It can act as a synergist to primary anti-oxidants in the role of a hydrogen donor, and, when enzymic oxidation is involved, can sometimes serve as a substrate. The nutritive value and chemistry of ascorbic acid, and the effect of oxygen on ascorbic acid in solution under controlled conditions, are described. The uses of ascorbic acid in connexion with oxidative browning in heat-processed foods, flavour and nutritive value in fruit and vegetable juices, and enzyme-catalysed oxidation in frozen fruits, are discussed. Its synergistic action in edible fats, its effects on the oxidation of frozen fish, of meat, and of dairy and beverage products, and its influence as a flour and dough improver, are also considered.

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0.118 A CHAINOMATIC PYCNOMETER FOR THE DETERMINATION OF CHLORINE IN SEA WATER

Rochford, D. J. (C.S.I.R.O., Cronulla, N.S.W.)
Nature 174, No. 4431, 641-642 (October 2, 1954)

The pycnometric method of salinity measurement as improved by Pettersson has been modified for use aboard scientific vessels of the Division of Fisheries of the Commonwealth Scientific and Industrial Research Organization, Australia. Essentially, the pycnometer consists of a weighted float submerged in sea water in a tall, calibrated glass cylinder.

The adapted model is basically the chainomatic pycnometer of Pettersson with the following improvements: (a) It is portable, folding as a unit into a carrying case, 15 x 7 1/2 x 3 1/2 inches. (b) The glass parts are extremely rugged. (c) Reproducibility of chain setting and high accuracy are insured by such features as the tension clutch in Fig. 1 (7) and the chain guide (10). (d) The calibration is in Cl 0/00 units, and calibration graphs permit rapid conversion of instrument data into Cl 0/00.

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 ABSTRACTER: Roy C. Stevens

0.118 (Cross References: 7.461, 9.11)

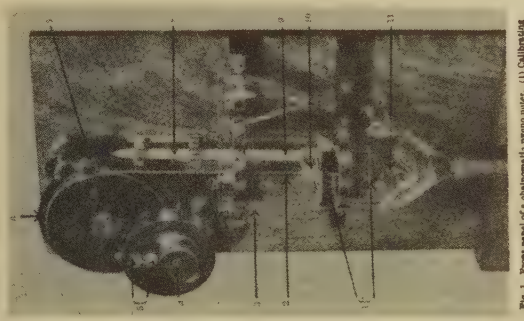

Fig. 1. Front panel of a chainmould: press motor; (2) Calibrating knob; (3) cod-liver oil; (4) cod-liver oil pump; (5) shaping knob; (6) chain-setting dial; (7) chain drum; (8) tension clutch; (9) thermometer; (10) float filler; (11) chain guide; (12) float

4.64

When added to cod liver oil, halibut oil, and other vitamin A concentrates, 0.03 percent octyl gallate is used. The gallate is dissolved in a small part of the oil and the solution obtained is then mixed with the bulk of the oil or concentrate.

Another application of the gallates in the fishing industry is said to have attractive possibilities. Herring fillets, dipped in refined herring oil stabilized with 0.05 percent dodecyl gallate, were shown to retain their fresh flavor and color for a considerable time in frozen storage.

Three figures and four tables are presented.

0,6 ANNUAL REPORT FROM THE DANISH MINISTRY OF FISHERIES RESEARCH LABORATORY FOR 1952

Anonymous
Fiskeriministeriets Forsogslaboratorium, 1953, 20 pp.
Food Science Abstracts 26, No. 3, 257 (May 1954)

A report to the Danish fishing industry on the work carried out in 1952, under the following headings: (1) live fish; (2) fresh fish; (3) frozen fish; (4) smoked fish; (5) semi-sterile canned fish; (6) canned fish; and (7) fish "silage". (1) Experiments are in progress on the storage of live lobsters (Homarus vulgaris) in an experimental tank. During storage, at 0° to 5° C., of live mussels (Mytilus edulis) in a wooden box, counts of Escherichia coli, initially low, did not increase. (2) Seasonal variations in the fat contents of herring from the Bloden fishing ground were examined. The effects of adding nitrite to the ice used for storing salmon on board ship were investigated. Disinfectants (Tego 51, chlorine, and quaternary ammonium compounds) for fish boxes were tested. (3) Experiments were carried out on the freezing of cooked, peeled, wrapped prawns, on the glazing of frozen salmon with solutions of ascorbic acid and of cellulose thickening agents (Tylose, Modocol, etc.), and on the dipping of fish fillets in salt solution before freezing. (4) Mackerel which had been frozen in brine and in air were hot-smoked, and the products were examined organoleptically. (5) Semi-sterile canned fish (Gaffelbiter or herring titbits, etc.) are preserved only with salt, sugar, organic acids (e.g. acetic acid), and a chemical preservative (e.g. benzoic acid) and are not subjected to any heat treatment. Studies have begun of the microflora and the bacterial and enzymic changes which occur during storage of the products, in order to find means of improving keeping quality. The effects on flavour of the composition of the sauce used, and of food adjuncts (Pescowell, a carbohydrate-containing material), were also examined. Gaffelbiter could be stored at -20° C. for several months with little loss of flavour. (6) Bacteriological investigations are being made of the rate of germination

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DANISH FISHERIES TECHNOLOGY, 1952

2.113 THE PERFORMANCE OF ALUMINIUM IN SHIPS

Lees, D. C. G.
Chemistry and Industry, No. 31, 949-955 (July 31, 1954)

Aluminum has been used in shipbuilding since as long ago as 1892. It is a desirable material because it is light in weight and resistant to corrosion. However, its resistance to corrosion is lessened when it is jointed with iron or steel, when it comes in contact with copper alloys, and when anti-fouling compositions containing mercury compounds are used on or near it.

Aluminum is commonly alloyed with magnesium in making plating, sections, and rivets; and with magnesium and/or silicon for making castings.

Two boats, one, a 30-foot lifeboat, the other, a 55-foot motor yacht, are cited as examples of the correct use of aluminum. Built in 1934 and 1931, respectively, these vessels have been thoroughly checked for corrosion periodically up to the present time. Little or no corrosion has taken place, and both are still in a seaworthy, serviceable condition.

Problems encountered when using aluminum in ship construction are dealt with in the following ways:

1. Aluminum-steel joints. Joints are so-placed that moisture does not collect around them, a gasket-like separator is placed between the metals, and/or the steel is surface-treated.

2. Aluminum/copper-alloy contacts. Fittings made of copper alloy are held to a minimum, careful insulating is done, and/or zinc anodes are used to "side-track" the electrolytic action between copper alloys and aluminum.

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 ABSTRACTER: M. R. Greenwood

THE USE OF ALUMINUM IN VESSELS

3.230 BREADED, COOKED FISH ERA SPURS MECHANIZATION OF PROCESS LINE

Barkalow, Frank
Quick Frozen Foods 17, No. 3, 104, 106 (October 1954)

A fully automatic processing line has been developed for the breading and frying of fish sticks. In addition to the saving in labor, the machine offers uniform product control and turns out an attractive looking product using less crumbs.

The fryer is designed to produce 1,000 pounds an hour, with an 80-second cook time at 375° F. Its B.t.u. capacity is 1,200,000. Cooking temperature is easily controlled and the simple adjustment of a control wheel regulates cooking time.

An automatic feeder with vibrator automatically spreads the product as it is carried from the breading machine and at the same time removes excess breading mix. Deposited on the infeed conveyor, the product is so placed that it enters the fryer in a consistent manner. The frying conveyor moves the product through the frying fat at a steady pace for complete and uniform cooking.

A self-cleaning automatic refrigerated cooler refrigerated with a 15-h.p. compressor cools the product to the desired temperature for packing. It is operated through two endless chains with light-weight, welded, pure tin-dipped carrying trays suspended between the chains. A built-in packing table is provided.

After the product is removed from the cooler, the trays are carried through a washing area located in the bottom of the cooler. When production is completed, hot water and detergent is added,

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 ABSTRACTER: Roy C. Stevens

AUTOMATIC FISH STICK PRODUCTION

3.230 USE OF MSG AT PROPER LEVEL DOUBLES PRODUCT'S CONSUMER ACCEPTANCE

Foster, Dean (United States Testing Co., Hoboken, N. J.)
Quick Frozen Foods 17, No. 3, 51-52 (October 1954)

As a result of discussion arising at the 1954 meeting of the National Fisheries Institute regarding the effectiveness of monosodium glutamate as a flavor-enhancing ingredient in breaded fish products, the United States Testing Company was asked to make a thorough and unbiased evaluation of MSG in fish sticks. They were asked to determine the following: (1) Did the addition of MSG at proper levels increase consumer acceptance? (2) Where in the production process would MSG be most successfully added? (3) How would the use of MSG affect consumer preference -- would a significantly greater number of people prefer fish sticks with MSG over fish sticks without MSG?

Fish sticks were carefully prepared to assure uniformity in the finished product. The only difference among the batches of coded fish sticks was in their MSG content.

The first test compared the flavor acceptance of samples treated with MSG at an .18% concentration by weight of fish with samples containing no MSG. In this case the MSG had been added to the dry batter mix. The results of this comparison are presented graphically below. It was found that 64% of the consumers preferred the fish sticks with MSG while only 36% preferred those without MSG.

The second test compared fish sticks with and without MSG at the .18% level, but this time the MSG had been added to the breading instead of to the batter. In this case, 67% of the consumers preferred the fish sticks with MSG.

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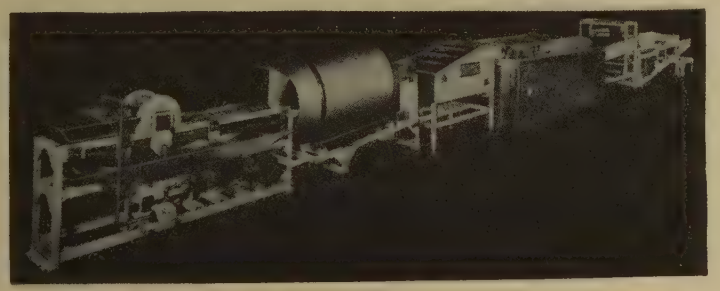
 ABSTRACTER: Roy C. Stevens

USE OF MSG IN FISH STICKS

3.230

which self-cleans the trays to keep them completely sanitary.

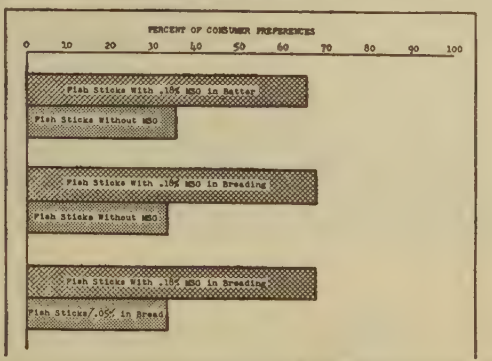
In addition to providing production control, the completely automatic operation reduces breakage and crippling to a minimum.



3.230

The final test compared fish sticks containing MSG at an .18% level with those containing the "usual" .05% MSG. Again, 67% of the consumers preferred the fish sticks treated at the .18% level. Thus, it was evident that the .05% level was no more effective than the complete absence of MSG.

From the above, it is seen that a three-fold increase in MSG at the production level, can bring about a two-fold increase at the sales level. A .15% to .18% concentration requires twenty ounces of MSG for one hundred pounds of wet batter, or twenty ounces of MSG per one hundred pounds of dry breading, either one of which will treat approximately 800 pounds of fish. At the present cost of MSG, the 800 pounds of fish could be treated with MSG at an effective level for $2.03. Thus, for one-fourth of a cent it is possible to treat one pound of fish with MSG and create a flavor which, from a consumer point of view, is significantly preferred over that of an untreated or insufficiently treated product.



0.6

of spores of putrefactive anaerobic bacteria, and the effect of carbon dioxide on normal and heated spores. The effects on the flavour of canned sild sardines of pre-treatment with sodium sulphite, and of the addition of various liquid smokes, are being investigated. The addition of a stabilizer to the mayonnaise used in canning prawns has been tested; a colouring material similar to the natural colour of the prawn is required in the mayonnaise. Processing experiments with new types of glass jar, and tests with Norwegian Lakseal aluminium cans, are also reported. Many common kinds of fish were packed experimentally in various types of electrolytic tinplate; the cans need to be lacquered, but the lacquers suitable for hot-dipped plate were not satisfactory for electrolytic plate. (7) Attempts were made to produce a dry fish "silage", by the addition of dry feeding-stuffs (e. g. lucerne meal); dehydroacetic acid was the most efficient fungicide. The hydrolysis of fish proteins during ensilage is being investigated as well as methods of ensilage.

2.113

3. Painting. Primers containing chromium compounds are used rather than those of lead, and some sort of pretreatment is desirable for good adhesion.

4. Anti-fouling compositions. Preventing corrosion due to chemical reactions between anti-fouling compounds containing mercury or copper and aluminum is still a problem. It is best avoided by first using a zinc or barium-chromate primer over which the anti-fouling compound is painted.

The use of aluminum in ship-building has progressed far in recent years. The liner, "United States", contains 2,000 tons of aluminum alloy and 1,200,000 aluminum-alloy rivets.

2.113 COLD GALVANIZING PROCESS

Anonymous
Pan American Fisherman 9, No. 3, 23 (October 1954)

A new product for the protection of iron and steel surfaces against corrosion has recently been announced. Applied by brush or spray, the paint is said to combine with the base metal to actually galvanize it. When used on a ship's hull the product is claimed to prevent sea growth, corrosion, and electrolysis.

The product differs basically from other so-called metallic paints containing zinc, in that it actually combines with the base metal, setting up electrical continuity. It leaves a coating of 96 parts, by weight, of chemically pure zinc; and on rusted areas it creates its own non-flaking coating, thereby stopping any further rust.

The product will dry tack-free in 40 minutes and will be completely dry for use within 48 hours.

 ABSTRACTER: Roy C. Stevens

3.17 A METHOD OF FACILITATING DISTRIBUTION OF GERMICIDAL SUBSTANCES THROUGHOUT ICE BLOCKS

Gillespie, D. C.; Bissett, H. M.; Boyd, J. W.; and Tarr, H. L. A.
Fisheries Research Board of Canada, Progress Reports of the Pacific Coast Stations, No. 99, 18-19 (July 1954)

A uniform distribution of germicides in ice is difficult to achieve when the germicidal solution is frozen slowly to produce a large block of ice. With flake ice machines, however, ices containing a uniform distribution of germicide can be made without difficulty. Unfortunately, very few British Columbia plants are equipped for making flake ice. The authors, therefore, investigated methods of producing block ice that would produce a uniform distribution of the germicide.

Cans, 9 1/2 x 6 1/2 x 4 1/2-inches in size and holding about 4 quarts of liquid were used in making various experimental germicidal ices by slow freezing in a room held at -15° F. The germicidal solution used in the experiments contained 1 p. p. m. of chlorotetracycline hydrochloride. A number of commercial wetting agents and a metal ion binding (chelating) agent were tried out as a means of keeping the chlorotetracycline uniformly distributed throughout the solution while it froze in the form of ice. These compounds were ineffective. The authors then tried different gel-producing or viscosity-increasing substances. These included carboxymethyl cellulose, methyl cellulose, gelatin, a commercial colloid, sodium alginate, and several carrageens obtained from seaweed. The carrageens gave the most promising results by improving gelling properties of the germicidal solutions when used with a small amount of potassium chloride. The carrageens also prevented to some extent the migration of chlorotetracycline toward the center of the ice blocks.

(over)

 ABSTRACTER: Martin Heerdt

7.41 REPORT ON FISH AND OTHER MARINE PRODUCTS

Voth, Menno D.
Journal of the Association of Official Agricultural Chemists 37, No. 3, 601-2 (August 15, 1954)

The Associate Referee on Total Solids in Oysters continued his investigations during the past year. A detailed study was made of the use of the forced draft oven, and other related phases of the work were also investigated. The findings of the Associate Referee on the use of the forced draft oven were very encouraging. This Referee recommended in his report that the use of the forced draft oven should be authorized for oyster work, since it results in a substantial saving of time.

The Associate Referee on Total Solids and Ether Extract in Fish and Other Marine Products made collaborative studies comparing the forced draft oven and the vacuum oven with the standard air oven in the determination of total solids in fish. Results obtained show that the forced draft oven is equally as good as the air oven and that its use results in a substantial saving in time. It is suggested that additional work be done which will indicate whether this method is applicable to marine products other than fish or oysters.

The Associate Referee also submitted to collaborative study a rapid method for ether extract in fish, as suggested last year. The results were not conclusive and further work is planned.

It is recommended--

(1) That the method for determining total solids in fish, as given in the Associate Referee's report and This Journal, 35, 216 (1952) be changed to authorize the use of the forced draft oven by inserting ahead of the last sentence the following "(preheated forced draft oven set for full draft for

(over)

 Reprinted in whole

3.12 ANTIOXIDANT ACTIVITY AND ANTAGONISM TO MICROBIAL GROWTH BY PIPERINE, ISONICOTINYL HYDRAZIDE AND RELATED COMPOUNDS

Hasselstrom, Torsten; Dateo, G. P.; Levinson, H. S.; and Stahl, W. H. (U.S. Army Quartermaster Corps, Philadelphia) and Hewitt, E. J and Konigsbacher, K. S. (Evans Research and Development Corp., New York)
Food Research 19, No. 4, 373-376 (July-August 1954)

In this study, ground black pepper, pepper oleoresin, piperine, β-cinnamenylacryloyl piperidide, β-cinnamenylacryloyl hydrazide, isonicotinyl hydrazide and tocopherol were investigated for their antagonism to fungal and bacterial growth. In addition, each of the aforementioned compounds and nordihydroguiaretic acid, propyl gallate, hydrogenated pepper oleoresin, acetylated pepper oleoresin, β-cinnamenylacryloyl acid, and 5-phenyl-3-pentenoyl hydrazide were investigated for their antioxidant activity. Black pepper oleoresin was obtained from the ground spice by ether extraction and subsequent removal of the oil portion from the ether extract. Pepper oleoresin was catalytically hydrogenated and acetylated for use in locating the origin of the antioxidant activity in black pepper. The 3 hydrazide compounds were chosen because of the structural relationship to piperine.

According to table 2 (this card, over) pepper oleoresin, β-cinnamenylacryloyl hydrazide, 5-phenyl-3-pentenoyl hydrazide, and isonicotinyl hydrazide showed definite antioxidant activity in concentrations of 0.1%. Isonicotinyl hydrazide had approximately 10 times the antioxidant value of pepper oleoresin and the tocopherols. Acetylated and hydrogenated black pepper oleoresin showed no antioxidant activity; therefore, it was concluded that the tocopherols of black pepper are responsible for its antioxidant properties. Black pepper in the concentrations commonly used in foods does not provide protection against deterioration. The resistance of black pepper to oxidation and microbial growth, however, appears to be due to its high concentration of tocopherols and oleoresins.

(over)

 ABSTRACTER: Martin Heerdt

COLD GALVANIZING PAINT

TOTAL SOLIDS IN OYSTERS

GERMICIDAL ICE

PRESERVATIVE COMPOUNDS

7.41

1 hr. at 100°C.)."

(2) That the method thus revised be adopted, first action.

(3) That collaborative work be continued on the suggested rapid method for ether extract in canned fish, extending it to fish other than canned salmon.

(4) That use of the forced draft oven for determining total solids in oysters be authorized by adopting, first action, the method suggested by the Associate Referee, worded as follows:

"Make duplicate detns. Weigh quickly 10 g of meats, liquid, or mixed meats and liquid, in flat-bottom metal dish ca 9 cm in diam. Spread sample evenly over bottom of dish, insert directly in preheated forced draft oven set at full draft, and dry 1.5 hrs at 100°C. Cool in desiccator and weigh promptly."

(5) That the use of chemical and viscosimetric methods for the determination of solids in oysters be investigated.

3.12

According to table 3 (this card, below) black pepper, pepper oleoresin, piperine, β-cinnamenylacryloyl-piperidide, β-cinnamenylacryloyl hydrazide, and isonicotinyl hydrazide inhibited fungal growth at concentrations of 0.1% and retarded fungal growth appreciably at concentrations of 0.01%. Pepper oleoresin and β-cinnamenylacryloyl piperidide were bacteriostatic at the same concentrations. Ground black pepper was antagonistic to bacterial growth at a concentration of 0.1%. Isonicotinyl hydrazide showed no bacteriostatic properties. This compound is known to be specifically bacteriostatic to Mycobacterium tuberculosis.

TABLE 3
Bacteriostatic and fungistatic activity

	Against *M. pyogenes* var. *aureus*				Against *Asp. versicolor*		
	Concentration, per cent						
	0.1%	0.01%	0.001%	Control	0.1%	0.01%	Control
	Number of colonies				Relative quantity of growth[1]		
Standard pepper	79	300	322	336	—	++	++++
Pepper oleoresin	0	184	302	336	—	++	++++
Piperine	[2]	320	322	336	—	+++	++++
β-cinnamenyl-acryloyl-piperide	0	0	238	336	—	+	++++
β-cinnamenyl-acryloyl-hydrazide	40	290	358	336	—	+	++++
Isonicotinyl hydrazide	341	332	328	336	—	+++	++++
Tocopherol	226	287	350	336	—		

[1] ++++ = heavy growth; +++ = medium growth; ++ = thin growth; — = no fungal growth.
[2] Count obscured by the separation of crystalline piperine.

TABLE 2
Antioxidant values on steam-distilled lard
(Lard control—4.5 hours)

Substance tested	Concentration, per cent		
	0.1	0.01	0.001
	Antioxidant value[3]		
Nordihydroguaretic acid[4]	..	....	72.0
Propylgallate[5]	.....	.....	40.0
Tocopherol	12.0	.....	....
Pepper	6.5	.....	
Pepper oleoresin	18.5	.....	
Hydrogenated oleoresin	4.5	.....	
Acetylated oleoresin	4.5	.....	
Piperine	5.5	.....	
β-cinnamenyl acryloyl piperidide	5.0	.....	
β-cinnamenyl acrylic acid	4.5	.....	
β-cinnamenyl acryloyl hydrazide	25.0	.....	
5-phenyl 3-pentenoyl hydrazide[6]	18.0	.....	
Isonicotinyl hydrazide	10.5.0	15.0	5.0

[1] Commercially available antioxidants.
[2] The 5-phenyl 3-pentenoylhydrazide was prepared in the following manner. 1 ml. of methyl ester of 5-phenyl-3-pentenoic acid was added dropwise to 5 ml. of hydrazine hydrate (85% solution) in 25 ml. of methanol. The mixture was heated on a steam bath for 1 hour. The excess solvent was evaporated, leaving a solid which was recrystallized from petroleum ether to constant melting point. M. p. 67.5°C. Analysis calculated for $C_{11}H_{12}ON_2$: N, 14.71. Found: N, 14.77.
[3] Hours elapsed until onset of rancidity.

3.17

The germicidal ice blocks after being removed from the cans were sawed in half horizontally and each half was then sawed vertically into 3 equal sections, making 6 sections in all, for sampling. Each section was then allowed to melt and the resulting ice water was assayed microbiologically for chlorotetracycline. Table 1 (this card, below) shows the results of a typical experiment in which 1 p.p.m. of chlorotetracycline and different concentrations of carrageens were added to the water used in making the ice.

Assays made by the pad plate method in the presence of carrageen gel showed about twice the expected amount of chlorotetracycline. According to table 1, 0.1% carrageen produced a relatively uniform distribution of chlorotetracycline throughout all sections of the ice blocks that were sampled. Carrageen was also effective at the 0.1% level when used in 300-pound blocks of ice that required about two days for freezing. Carrageen at the 0.1% level was not effective in producing a uniform distribution of sodium nitrite (1000 p.p.m.) in blocks of ice. Further experiments are in progress.

TABLE 1.—Effect of different levels of carrageen in improving distribution of chlorotetracycline in experimental ice blocks.

Carrageen	Chlorotetracycline content in different sections[a] (p.p.m.)					
%	1	2	3	4	5	6
0	0.6	0.6	0.6	1.2	6.5	0.6
.005	0.7	1.0	0.7	1.9	4.2	2.1
.01	0.8	0.9	0.6	2.8	3.2	2.6
.02	0.7	0.9	0.9	3.3	2.8	1.4
.10	1.6	1.6	1.8	1.8	1.8	1.8

[a] Position of test portions:

1	2	3
4	5	6

6.233 VITAMIN A IN FISH LIVERS. AN EXTRACTION TECHNIQUE FOR VITAMIN A, OF INDUSTRIAL APPLICATION

Martin Perez, C. S.
Ion 13, 61-6, 80 (1953)
Chemical Abstracts 47, No. 18, 9571 (1953)

Five methods were compared for the recovery of vitamin A from punctured fish liver: (1) a mixt. of 2 parts flour, and 1 part fish liver was extd. with $CHCl:CCl_2$ at 40°; (2) fish liver was digested with 30% by wt. solid KOH, then mixed with 2 parts flour, and extd. with $CHCl:CCl_2$ at 40°; (3) a mixt. with 6-8% by wt. NaOH and 2 vols. water was digested 40 min. at 85°, centrifuged; (4) the product from the third method was extd. with C_6H_6; (5) fish liver was digested 60 min. at 100° with 7-18% by wt. vegetable oil, centrifuged, and the residue was redigested in the same manner. Method (2) gave the most concd. exts. with 98-100% recovery of original vitamin A content.

6.2331 A NEW METHOD FOR EXTRACTING FISH LIVERS FOR MAXIMUM YIELD OF VITAMIN A

Kulbins, I.
Latvijas PSR Zinatnu Akad. Vestis, No. 10 (Whole No. 39), 61-7 (1950)
Chemical Abstracts 48, No. 5, 2990 (1954)

The fish livers are finely ground and passed into a horizontal steam-jacketed vacuum extractor. Cooking for 80 min. under CO_2 at variable temps. gives the best grade oil. Recovery with cod livers equaled 68.3% of total vitamin A (I). The residue (14% of same material) was then pressed to yield 28.3% of the total vitamin A (II). The pressing time was 30 min. The yield of oil from the raw material was 41.57% from I and 19.14% from II. The av. free fatty acid content was 1.5% for unrefined oils I and II and 1.35% for the refined oil.

6.3 VARIOUS GRADES OF SEAWEED MEALS

Kirschninck, Heinz
Seifen-Ole-Fette-Wachse 80, 91-3 (1954)
Chemical Abstracts 48, No. 13, 7815 (1954)

A review of the sources and components of seaweed meals and of their use as feeds.

6.3 AGAR-AGAR FROM GRACILARIA CONFERVOIDES. II.

Akiya, Shichiro and Tanimura, Akio
J. Pharm. Soc. Japan 74, 125-8 (1954)
Chemical Abstracts 48, No. 10, 6076 (1954)

6.4 CHEMICALS FROM FATS

Sethi, S. C.
Oils & Oilseeds J. (India) 5, No. 10/12, 65-8 (1953)
Chemical Abstracts 48, No. 16, 9715 (1954)

This is a review on the prepar. of alcs., aldehydes, acid anhydrides, acid chlorides, ketones, amides, nitriles, amines, quaternary ammonium compds., and S-contg. derivs., from fats. 41 references.

6.51 HOW MAY FISH HATCHERY FOODS NEEDS BE MET

Sinnhuber, Russell O.
Fish Commission of Oregon Research Briefs 4, No. 1 (December 1952)

(Abstract of this article appears under 9.14 page 5 - November 1954 issue)

6.54 CHEMICAL STUDY OF PUTREFACTION OF FISH MUSCLE. III. MANUFACTURE OF FOOD YEAST FROM PUTREFIED FISH

Higashi, Hideo; Okada, Minoru; and Yamade, Juami
Bulletin of the Japanese Society of Scientific Fisheries 16, 443-6 (1951)
Chemical Abstracts 47, No. 16, 8280 (1953)

6.59 THE CHEMICAL NATURE OF THE PROCESS OF PREPARATION OF PROTEIN PRODUCT FROM CODFISH

Yuditskaya, A. I. and Kolchev, V. V.
Rybnoe Khoz. 29, No. 6, 57-9 (1953)
Chemical Abstracts 47, No. 19, 10043 (1953)

7.42 DETERMINATION AND DISTRIBUTION OF COPPER IN SEA WATER. I. THE SPECTROPHOTOMETRIC DETERMINATION OF COPPER IN SEA WATER

Chow, Tsaihwa, J. and Thompson, Thomas G.
J. Marine Research 11, 124-138 (1952)
Chemical Abstracts 47, No. 6, 2630 (1953)

7.42 CHEMICAL STUDIES ON THE OCEAN. XXVIII. DETERMINATION OF ALUMINUM IN SEA WATER

Ishibashi, Masayoshi and Fujinaga, Taichiro
J. Chem. Soc. Japan, Pure Chem. Sect. 73, 783-5 (1952)
Chemical Abstracts 47, No. 12, 5840 (1953)

7.43 DETERMINATION OF THE WATER-BINDING POWER OF MUSCLE

Grau, R. and Hamm, R.
Naturwissenschaften 40, 29-30 (1953)
Chemical Abstracts 47, No. 21, 11299 (1953)

7.51 PROTEINS AND THEIR DECOMPOSITION PRODUCTS. VI. QUANTITATIVE ANALYSIS OF POLYPEPTIDE MIXTURES BY MEANS OF PAPER CHROMATOGRAPHY

Heyns, K. and Anders, G.
Hoppe-Seyler's Z. physiol. Chem. 287, 109-19 (1951)
Chemical Abstracts 48, No. 3, 1459 (1954)

7.51 WATER-SOLUBLE CRUDE PROTEIN IN HERRING MEAL

Moen, A.
Meld. Norg. Landbrukshogsk 31, 23-32 (1951)
Food Science Abstracts 25, No. 6, 650 (November 1953)

7.52 DETERMINATION OF TYROSINE, TRYPTOPHANE, METHIONINE, AND CYSTINE IN ALBUMINS OF CHILEAN FISHES: STOCKFISH, FLOUNDER, AND CARP

Sas, Saul S.
Tesis quim., Univ. Chile 2, 33-46 (1950)
Chemical Abstracts 47, No. 14, 7120 (1953)

7.66 CHEMICAL DETERMINATION OF VITAMIN D. I. ANTIMONY TRICHLORIDE REACTION AND THE SEPARATION OF VITAMIN D FROM VITAMIN A

Kanzawa, Tokunosuke and Mima, Hiroyuki
Pharm. Bull. (Japan) 1, 195-9 (1953)
Chemical Abstracts 48, No. 18, 10827 (1954)

7.66 CHEMICAL DETERMINATION OF VITAMIN D. II. SEPARATION OF VITAMIN D FROM STEROLS AND THE DETERMINATION OF VITAMIN D IN FISH-LIVER OILS

Kanzawa, Tokunosuke and Mima, Hiroyuki
Pharm. Bull. (Japan) 1, 199-202 (1953)
Chemical Abstracts 48, No. 17, 10101 (1954)

7.66 THE CHROMATOGRAPHIC SEPARATION AND THE DETERMINATION OF VITAMIN D_2 IN CORN OIL -- THE CHROMATOGRAPHIC SEPARATION AND THE DETERMINATION OF VITAMINS D IN VARIOUS OILS CONTAINING VITAMIN A

Schabach, Tom D.
Univ. Microfilms, Publ. No. 7479, 75 pp.
Chemical Abstracts 48, No. 12, 7104 (1954)

8.42 BIOCHEMICAL STUDIES ON PEARLS. II. SEASONAL VARIATION IN THE INORGANIC COMPOSITION OF PEARL OYSTER, PINCTADA MARTENSII

Tanaka, Shozo and Hatano, Hiroyuki
J. Chem. Soc. Japan, Pure Chem. Sect. 74, 74-6 (1953)
Chemical Abstracts 47, No. 20, 10747 (1953)

8.42 DISTRIBUTION OF SULFUR IN SOME MARINE FISHES FROM BOMBAY

Airan, J. W. and Master, R. W. P.
J. Univ. Bombay 22, Pt. 3, Sci.No. 34A, 72 (1953)
Chemical Abstracts 48, No. 17, 10237 (1954)

8.42 CATHODO-LUMINOGRAMS OF FISH BONES

Hakomori, Shinichiro and Tamura, Shohei
J. Chem. Soc. Japan, Pure Chem. Sect. 74, 483-6 (1953)
Chemical Abstracts 48, No. 4, 2274 (1953)

Bi, Mn, Zn, and Cu in the bones of Cybium niphonium and Paralichthys olivaceus were detected by the cathodo-luminogram.

8.50 BIOCHEMICAL STUDIES ON SKIPPER (COLOLABIS SAIRA). I. GENERAL COMPONENT

Tsuchiya, Yasuhiko; Hata, Mitsuo; Asano, Motokazu; Takahashi, Iwao; Nomura, Tadashi; and Suzuki, Yoshio
Bulletin of the Japanese Society of Scientific Fisheries 19, No. 4, 513-17 (August 25, 1953) (English summary, figures and tables)

8.50 BIOCHEMICAL STUDIES ON SKIPPER (COLOLABIS SAIRA). II. MOISTURE AND CRUDE FAT CONTENT

Hata, Mitsuo and Tashiro, Masao
Bulletin of the Japanese Society of Scientific Fisheries 19, No. 4, 518-24 (August 25, 1953)

8.51 STUDY OF THE SERUM LIPOPROTEINS IN SOME FISH BY MEANS OF PAPER ELECTROPHORESIS

Drilhon, Andree
Compt. rend 238, 940-2 (1954)
Chemical Abstracts 48, No. 12, 7212 (1954)

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Biochemical Journal
Bulletin of the Faculty of Fisheries, Hokkaido University
Bulletin of the Japanese Society of Scientific Fisheries
California Fish and Game
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Canadian Journal of Technology
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Food Processing
Food Research
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Industrial and Engineering Chemistry
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Journal of Biological Chemistry
Journal of Home Economics
Journal of Nutrition
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Meldinger Fra SSF (Herring Industry, Norway)
Modern Packaging
Modern Refrigeration
National Fisherman
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Pan American Fisherman
Poultry Science
Practical Home Economics
Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
Report of the Food Investigation Board (Great Britain)
Science
Southern Fisherman
Trade News (Fisheries Department, Canada)
Western Fisheries
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

8.53 THE FAT AND WATER CONTENT OF THE EDIBLE PART OF THE HERRING

Brandes, C. H. and Dietrich, R.
Fette u. Seifen 55, 533-41 (1953)
Chemical Abstracts 48, No. 13, 7811 (1954)

Based on a large no. of detns., a fat content vs. H_2O content graph is given; the fat content can be read off after detg. the H_2O content.

8.53 DIETARY FAT AND BODY FAT: THE COMPOSITION OF THE BACK FATS OF PIGS FED ON A DIET RICH IN COD-LIVER OIL AND LARD

Garton, G. A. and Duncan, W. R. H.
Biochemical Journal 57, No. 1, 120-125 (May 1954)

(Abstract of this article appears under 4.99 page 1 - October 1954 issue)

8.53 ON THE SEASONAL VARIATIONS OF THE LIVER WEIGHT AND OIL CONTENT OF THE MACKEREL

Noguchi, Eizaburo and Bito, Masamichi
Bulletin of the Japanese Society of Scientific Fisheries 19, No. 4, 525-32 (August 25, 1953)
(English summary, figures, and table)

8.65 CHANGE IN VITAMIN C CONTENT OF PORPHYRA TENERA ON DRYING AND DURING PRESERVATION

Katayama, T.; Yabuki, T.; and Tomiyama, T.
Bulletin of the Japanese Society of Scientific Fisheries 15, 415-18 (1949)
Chemical Abstracts 48, No. 17, 10250 (1954)

By detg. the decrease in vitamin C on drying and preserving under various conditions, it was shown that the change in vitamin C of laver takes place to a great extent during preservation by the combined action of moisture and ascorbic acid oxidase.

8.65 THE CONTENT OF VITAMIN C IN PORPHYRA TENERA

Yabuki, T.; Katayama, T.; and Tomiyama, T.
Bulletin of the Japanese Society of Scientific Fisheries 15, 249-52 (1949)
Chemical Abstracts 48, No. 17, 10250 (1954)

An appreciable change in vitamin C (I) was not noticed during the growth of laver. Diurnal change in I was not observed. Freshly collected laver, when preserved in brackish water having values of pH 5.8-9.8 and salinity higher than 1.8%, did not show decrease in I content. When preserved at temps. over 20° the content of I remained const. after 3 hrs., but decreased to a great extent after 12 hrs.

8.65 ASCORBIC ACID CONTENT OF THE INTERRENAL OF FISH (SELACEANS AND TELEOSTS)

Fontaine, Maurice and Hatey, Jeanine
Bull. inst. oceanog. 51, No. 1037, 7 pp. (1954)
Chemical Abstracts 48, No. 17, 10239 (1954)

9.12 BIOLOGIST OBSERVES NORWEGIAN HERRING TAGGING OPERATION

Scattergood, Leslie W.
Maine Coast Fisherman 8, No. 12, 23 (July 1954)

9.14 FISH FOOD

Otter, Harold S.
U. S. Patent 2,583,964 (January 29, 1952)
Chemical Abstracts 46, No. 8, 3680 (1952)

The method involves mixing dry ingredients at controlled temps. to prevent deterioration of the food.

9.14 I. A VITAMIN-TEST DIET FOR CHINOOK SALMON. II. THE WATER-SOLUBLE VITAMIN REQUIREMENT FOR CHINOOK SALMON

Halver, John E.
Dissertation Abstracts 13, 656-7 (1953)
Chemical Abstracts 48, No. 4, 2274 (1953)

9.16 FISH OF THE FIELD

Anonymous
Canadian Fisherman 41, No. 7, 24 (July 1954)

(Abstract of this article appears under 1.015 page 13 - October 1954 issue)

9.19 CONTROL AND TIMING OF FISH MIGRATION

Hoar, Wm. S.
Biol. Revs. Cambridge Phil. Soc. 28, 437-52 (1953)
Chemical Abstracts 48, No. 3, 1586 (1954)

A discussion of the various factors involved in the physiol. control of fish migration. Increased activity in the thyroid gland and gonads has been involved in most fish that migrate upstream. Treatment with thyroid and gonadic hormones increased the activity of salmon. The precise pattern of migration depends upon a delicate interrelationship between the fish and cyclical changes in its environment.

9.19 EFFECTS OF CHEMICALS ON A SCHOOLING FISH, KUHLIA SANDVICENSIS

Hiatt, Robert W.; Naughton, John J.; and Matthews, Donald C.
Biol. Bull. 104, 28-44 (1953)
Chemical Abstracts 47, No. 12, 6566 (1953)

2.9 EXTRACTION OF GLOBE-FISH POISON

Suzuki, Minoru and Kawamura, Masao
Japan. Patent 5894 (1953)
Chemical Abstracts 48, No. 16, 9632 (1954)

An aq. soln. of globe-fish poison, prepd, by paper partition chromatography in a phenolic solvent, is adsorbed by activated C and liberated by extn. with 30% MeOH or EtOH.

2.9 CONSTITUENTS OF THE OVARIES OF THE GLOBEFISH. VI. PURIFICATION OF GLOBEFISH POISON BY CHROMATOGRAPHY

Tsuda, Kyosuke and Kawamura, Masaaki
J. Pharm. Soc. Japan 72, 187-90 (1952)
Chemical Abstracts 47, No. 5, 2191 (1953)

2.9 ACTION OF SHELLFISH POISON ON PERIPHERAL NERVE AND SKELETAL MUSCLE

Fingerman, M.; Forester, R. H.; and Stover, J. H.
Proceedings of the Society for Experimental Biology and Medicine 84, No. 3, 643-646 (December 1953)

3.12 THE INFLUENCE OF SODIUM NITRITE ON THE PRESERVATION OF FISH

Szafranski, Kazimierz; Szymczyk, Franciszek; and Krauze, Stanislaw
Roczniki Panstwowego Zakladu Hig., No. 3a, 347-54 (1953)
Chemical Abstracts 48, No. 9, 5391 (1954)

3.13 STORAGE OF SMOKED FISH IN AN ATMOSPHERE OF CARBON DIOXIDE

Kasatkin, F. S. and Gabrielyants, M. A.
Rybnoe Khozyaistvo 26, No. 7, 20-2 (1950)
Chemical Abstracts 48, No. 14, 8441 (1954)

Expts., which are described in detail, showed that smoked fish stored at 0-3° and 50% relative humidity in an atm. of CO_2 kept about twice as long as fish exposed to the air.

3.13 MICROBIOLOGICAL DETERIORATION OF FISH POST MORTEM, ITS DETECTION AND CONTROL

Tarr, H. L. A.
Bacteriological Reviews 18, No. 1, 1-15 (March 1953)

(Abstract of this article appears under 3.12 page 13 - July 1954 issue)

3.238 PLASTIC FILMS AT LOW TEMPERATURES

Freeman, A. J.; Sheridan, L. W.; and Renfrew, M. M.
Modern Packaging 27, No. 10, 147 (June 1954)

3.238 A VAPOR BARRIER OF LAMINATED MYLAR AND ALUMINUM

Macormack, James G.
Refrigerating Engineering 62, No. 7, 58-60 (July 1954)

3.238 POLYETHYLENE AS A FOOD FILM

Thor, C. J. B. and Goldman, M.
Modern Packaging 27, No. 9, 155-158 (May 1954)

3.239 THE ROLE OF OSMOTIC DEHYDRATION IN THE PROTECTIVE ACTION OF GLYCEROL AGAINST FREEZING INJURY

Luyet, B. J. and Keane, J. F.
Biodynamica 7, 141-55 (1953)
Chemical Abstracts 48, No. 10, 5891 (1954)

3.26 DOES THE MECHANICALLY REFRIGERATED FREIGHT CAR DO ITS JOB?

Ransom, Ralph W.
Refrigerating Engineering 62, No. 7, 51 (July 1954)

A packer and shipper of meat products reports on his studies of requirements, the systems available today, and actual operation. His answer is yes.

3.26 MECHANICAL REFRIGERATION VERSUS ICE FOR RAILROAD SHIPMENTS

Plummer, K. V.
Refrigerating Engineering 62, No. 7, 49 (July 1954)

3.26 LOCKER PLANTS IN THE UNITED KINGDOM--III. ARCHITECTURE

Nicholls, A. S.
Modern Refrigeration 56, No. 667, 366 (October 1953)

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Analysis, organic		
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Danish fishing industry report for 1953	7	1.0142
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